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1926

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THE RAILWAY MAGAZINE.

MID-DAY WEST COAST ANGLO-SCOTTISH EXPRESS, L.M.S.R.

New Three-Cylinder Compound 4-4-0 Locomotive No. 1152.

Stock painted in L.M.S. Colours.

(From a Photograph by F. E. Mackay.)

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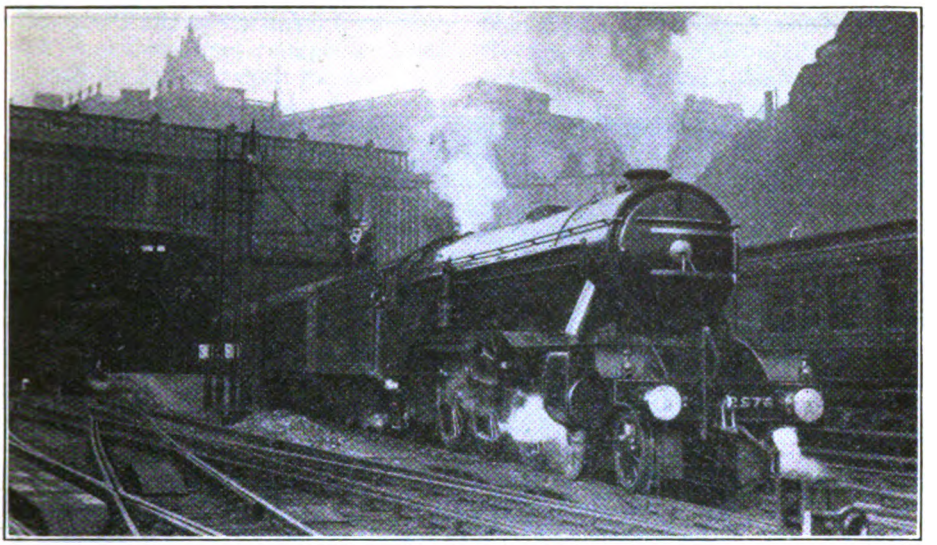

Photo.] [*L.N.E.R.*

UP "FLYING SCOTSMAN" LEAVING FOR LONDON.

Notable Railway Stations and their Traffic.

WAVERLEY, EDINBURGH, L.N.E.R.

By J. F. GAIRNS, M.Inst.T., M.I.Loco.E.

WAVERLEY station, the largest in Scotland, and capable of putting up a very strong claim to be regarded as the largest in Great Britain—in that four of its quarter-mile platforms will each accommodate two trains simultaneously, so that it is possible for 23 trains to be dealt with at the same time—has on two former occasions received attention in the pages of THE RAILWAY MAGAZINE. In the February, 1900, number it was described by Mr. Philip Whitwell Wilson, though, at that time, the "great reconstruction" carried out during the closing years of the nineteenth century was not quite completed. Consequently, Mr. Wilson, while describing the station, devoted special attention to the work of reconstruction, including the erection of the new North Bridge, towards the cost of which the then North British Railway Company subscribed. In April, 1912, the station received attention again, at the hands of Mr. John Robertson. That article described the station in its finished condition fairly thoroughly, but special attention was given to features of traffic working as then in operation.

In every way, however, Waverley deserves the term "notable," and in view of its unique characteristics and the special interest which it has to all Anglo-Scottish travellers, there is every justification for a new article dealing with conditions as they are at present, though the principal changes, as compared with the situation in 1912, are that all platforms are now barriered off, so that Waverley ranks as an enclosed station—although the booking hall and other premises are right in the centre—and that route-indicating signals have simplified the necessarily elaborate signalling origially installed.

Of the first stations at Waverley, one was that of the original North British Railway, when it consisted mainly of the line from Berwick to Edinburgh, another was the terminus of the old Edinburgh, Perth and Dundee Railway, and a third was that which was erected when the Edinburgh

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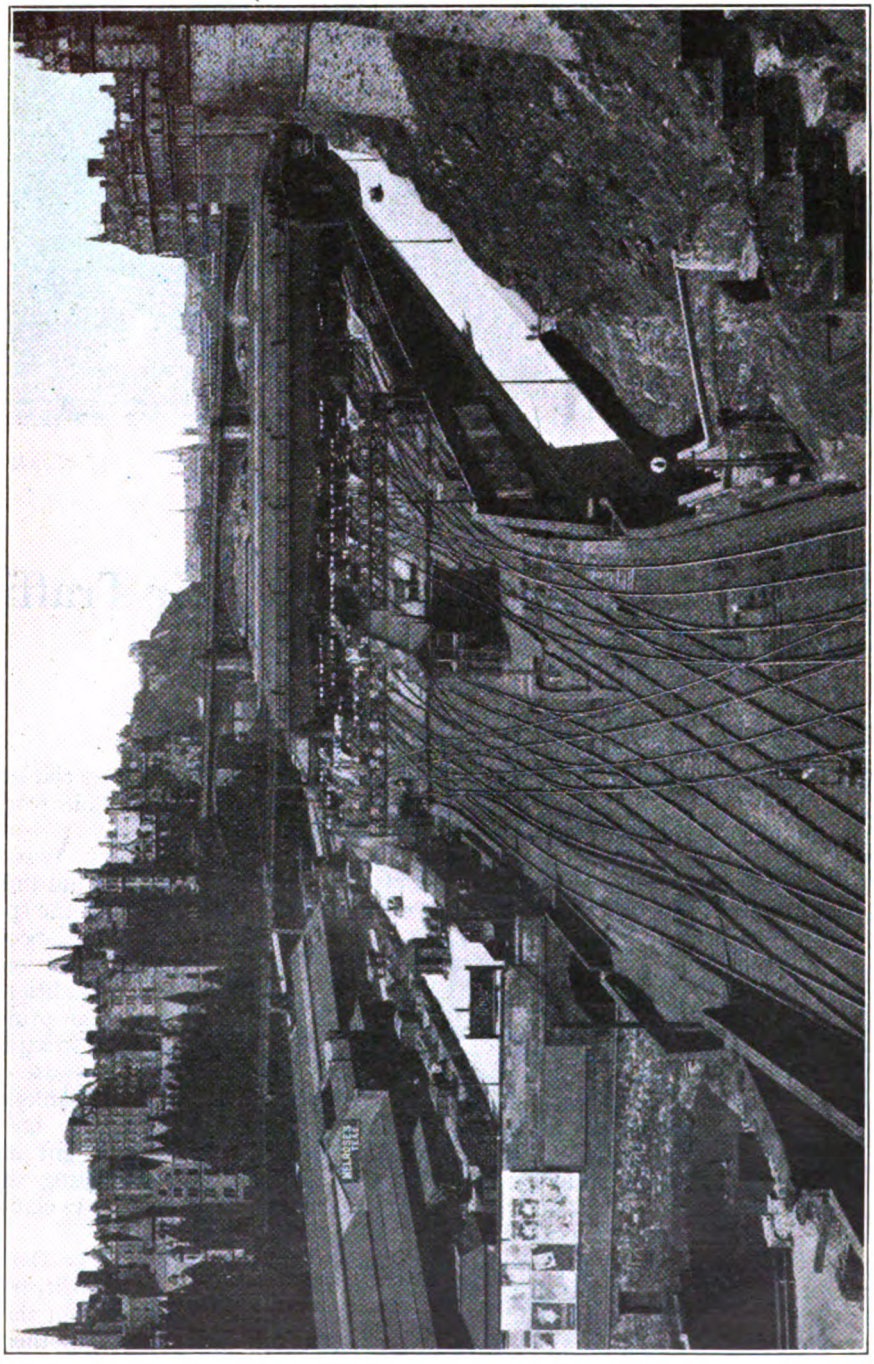

Photo.] GENERAL VIEW OF STATION FROM THE EAST. [A. H. Robinson.

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and Glasgow Railway extended from Haymarket to enable direct connection to be made with the North British Railway, and which became necessary when these component lines were merged into the enlarged North British Railway resulting from the amalgamations of 1862 and 1865. The old North British station was substantially on the site of what is now the eastern end of Waverley station, the Edinburgh and Glasgow line extending to a station having through connection therewith, but towards the western end. The terminus of the Edinburgh, Perth and Dundee Railway was immediately adjacent and approximately at right angles, but with connection to the lines running west. This line extended through a steep gradient tunnel operated by cable haulage as far as Scotland Street, near the site of the present Scotland Street goods depot, and continued thence to Granton, communication with lines north of the Firth of Forth being made by train ferry steamer. A ferry service is still maintained, though not as a train ferry and bereft of its old importance by the opening of the Forth Bridge and connecting railways. Goods traffic is operated south to Scotland Street goods depot, but the remaining section, that in tunnel, has long been disused, and for many years has been devoted to mushroom culture, except that one track is retained for handling the traffic of the mushroom company. The Edinburgh, Perth and Dundee station was on the site of the present hotel and Waverley Market, and traces of the station can still be seen on the northern wall of Waverley station beyond the up main and adjacent tracks.

The early stations gave place to the much larger Waverley which did duty until the concluding years of the nineteenth century. Increasing traffic, however, rendered it imperative to undertake complete reconstruction and modernisation of the station, necessarily at heavy expense, and at the time Mr. Wilson's article was published the station as known to the present generation was in full operation, though still unfinished in regard to certain details.

Although Waverley takes its name from the Waverley Market which at one time occupied part of the curious ravine which separates the Old and New Towns, the site at an earlier date was on that of the North Loch. This was drained long before the railway era, but more than a hundred years ago the corporation erected a bridge spanning the ravine, the predecessor of the present North Bridge. This gave place to a later erection, consisting of a number of arches of varied span, but as its design constituted a serious hindrance to the reconstruction of the station, and the bridge was, moreover, already inadequate for the traffic needs of the city, an important part of the station reconstruction was the erection of a new North Bridge, towards the cost of which the railway company subscribed.

The present North Bridge has three fine spans of considerable height and ranks as a graceful and artistic erection. Unfortunately, the railway company, in designing the new station, was restricted in vertical height, and this necessitated the station roofing being maintained within 42 ft. above rail level and precluded a design with high long-span roof sections Speaking generally, however, as seen from platform level, the whole design of the station is distinctly artistic, and this applies especially to the central block of buildings, accommodating booking hall, refreshment rooms, waiting rooms, &c., while from above, relatively speaking, comparatively little of the station can be seen, except from a distance.

The special feature of the present Waverley station is that the main part is laid out as one huge island platform. This is embraced by the down and up main lines, each of which is paralleled by two non-platform lines. The up main platform is 1,607 ft. long and the down main platform 1,567 ft. in length, and are thus long enough to accommodate two average-length trains simultaneously. As these platforms are associated with a great deal of re-marshalling and division or combination of trains, several crossovers are laid in between the platform and adjoining lines, and elaborate signalling is installed for the control of the movements thus involved within station limits.

Alongside the main station is what is known as the Suburban station, another long island platform nearly as long as those in the main station, but having its two through faces only. This can be used even for trains which would normally be handled in the main station, and, in cases

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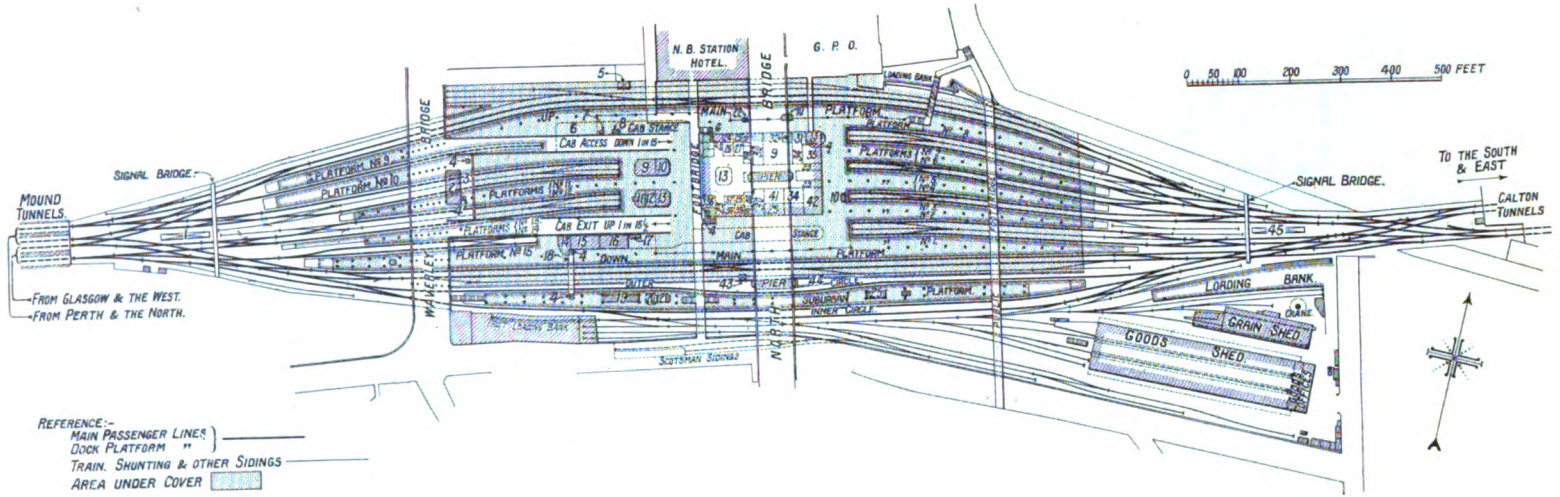

(Covered Area shown Stippled.)

PLAN OF WAVERLEY STATION, SHOWING PLATFORMS, LINES, APPROACHES AND PRINCIPAL OFFICES, ETC.

1. West Signal Cabin.
2. Parcel Office.
3. Parcel Yard
4. Hoist.
5. North Signal Cabin.
6. Carted Luggage, Parcels, &c.
7. Ticket Collectors.
8. Ambulance.
9. Left Luggage Room.
10. Bookstall.
11. Bar (West End).
12. Train Letters.
13. Booking Office.
14. Staff.
15. Kitchen and Canteen.
16. Parcels Store.
17. Cab Office.
18. Luggage Bridge.
19. Waiting Rooms.
20. Suburban Signal Cabin.
21. Booking Office.
22. Tobaccos.
23. Passage.
24. L.M.S. Office.
25. Offices.
26. Gentlemen's 1st Class Waiting Room.
27. Ladies' 1st Class Waiting Room.
28. Ladies' Lavatory.
29. Entrance to Upper Floors.
30. Gentlemen's Lavatory.
31. Tea Room and 3rd Class Bar.
32. Telegraph Office.
33. Post Office.
34. Service Room.
35. 1st Class Refreshment Room.
36. Enquiry Office.
37. Seats and Sleepers.
38. Season Ticket Office.
39. Ladies' 3rd Class Waiting Room.
40. Ladies' 3rd Class Lavatory.
41. Station Masters' Dept.
42. Dining Room.
43. South Signal Box.
44. Water Tank, &c.
45. East Signal Cabin.

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of emergency, even principal East Coast expresses may arrive thereat or depart therefrom, though this is not usual. These platforms are, moreover, each long enough for two trains simultaneously, so that as there are 15 terminal lines in the main station, and each of the up and down main and up and down suburban platforms will accommodate two average-length trains simultaneously, it is possible for 23 to occupy Waverley station at the same time.

Public access to Waverley station is available from four directions. Perhaps the busiest is that approximately midway, *via* Waverley Steps, direct from Princes Street, on the north. There is also an entrance on the other side of the station from Market Street on the south side. Between the two is a wide footbridge, with stairways direct to the main circulating area, adjacent to the central booking hall on either side of the central block, and to the suburban platforms. Actually, this footbridge constitutes a convenient means of passing from one station to the other, and between Princes Street and Market Street, being extensively used by non-passengers. It is not, however, a public right-of-way, and is closed on Sundays.

There is, however, a public footbridge across the station at the eastern end, and from this a footway is provided into the station between the up main and No. 8 platforms, constituting a convenient entrance to the station from Leith Street. What is really the main entrance to Waverley station—though by no means the most extensively used—is provided by Waverley Bridge, connecting Princes Street and Market Street at the west end of the station. From this bridge, which is a wide thoroughfare, two slopes are provided, one for arriving and one for departing cabs. These ramps lead down to the main circulating area west of the central block, and give access to the cab yard on the down main side and to a space adjoining the parcels department alongside the west end of the up main platform. The Waverley Bridge entrance is, by the way, open on Sundays, except during a few hours when no trains whatever are dealt with at Waverley station, this being the only respite during the whole of the week. There is also a stairway from Waverley Bridge to the suburban platforms.

To the south of the station, alongside the suburban station, are the shunting lines associated with the Waverley goods depot, which opens out to accommodate warehouse and goods lines towards the eastern end of the station. Including the goods depot, Waverley has the distinction of occupying an area of 23 acres, of which 11½ acres are covered.

All trains approaching Waverley from the east pass through one or other of the two Calton Hill tunnels. One of these is the original, the other having been pierced when the last reconstruction of the Waverley station was in progress. Each accommodates an up and a down line, either pair being accessible to or from every platform at the east end of the station, though, in practice, trains are usually worked as most convenient according to platform use, interchange being made as necessary at Abbeyhill Junction, east of Calton Hill tunnels. At the west end there are station lines also converging into four tracks—up, down, up, down—this arrangement applying through the cutting between the two parts of East Princes Street Gardens, through the tunnels under the Mound, originally Edinburgh's dustheap, but now crowned by the Royal Scottish Academy and the National Gallery, south of West Princes Street Gardens, and round the base of the huge mass of rock upon which Edinburgh Castle stands, and through the Haymarket tunnels.

East of Waverley Bridge the whole station is spanned by the North Bridge, but this provides no connection with the station, in that it was erected as a public thoroughfare across the ravine, though its supporting pillars are necessarily incorporated in the station structure. At the corner of the North Bridge and Princes Street is the now well-known North British Station Hotel, a notable erection, ranking as the largest and in many ways the best hotel in Scotland, and, with its large clock tower, constituting a distinctive feature in views of the locality from whatever point they are obtained. Westwards, the hotel overlooks picturesque gardens laid out above the present Waverley fruit and vegetable market (the successor to the old Waverley Market which gave

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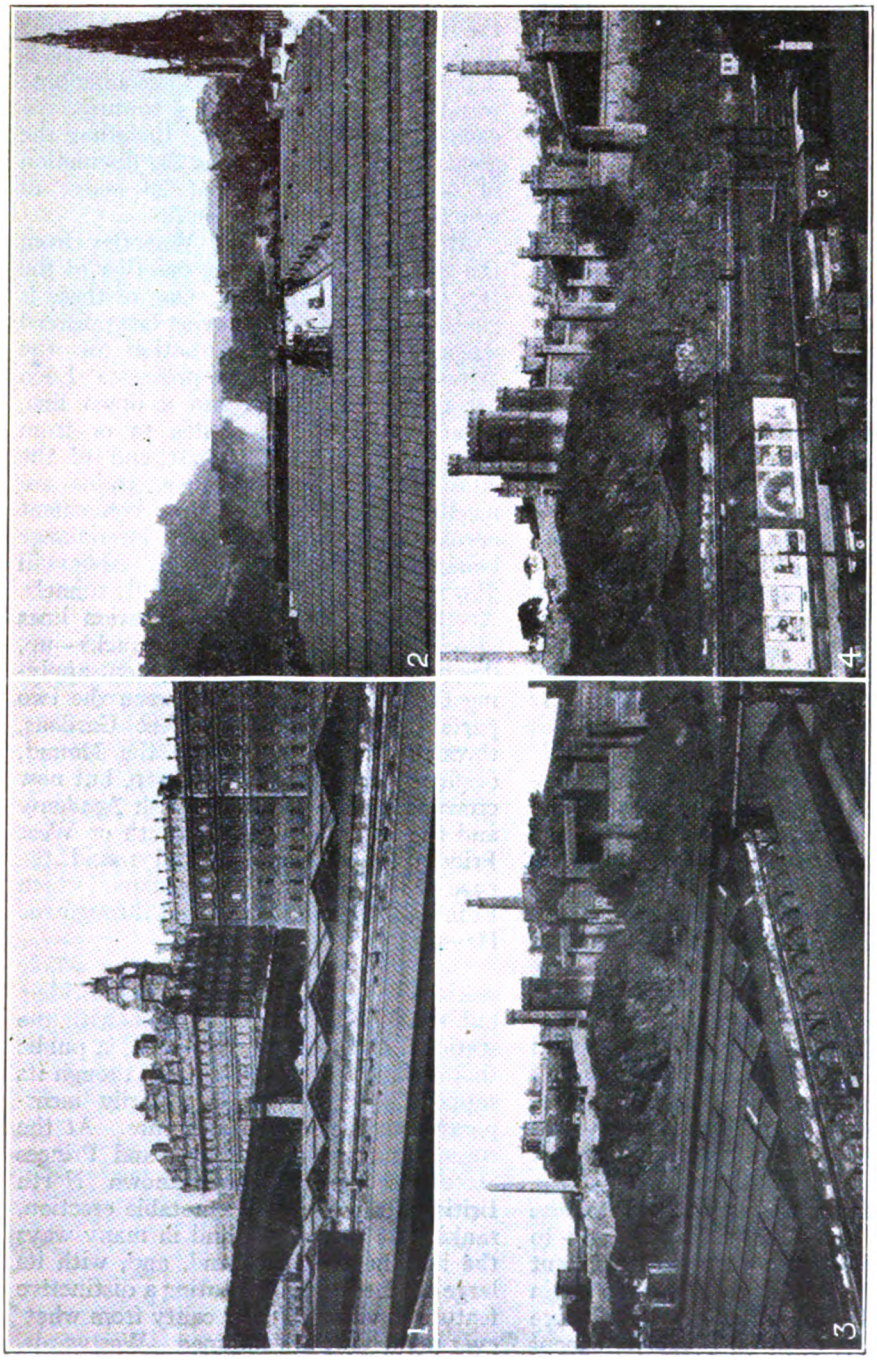

1. North Bridge and North British Station Hotel.
2. From North Bridge looking towards Scott Monument and Edinburgh Castle.
3. Looking towards Nelson Monument on Calton Hill.
4. Another view over Station towards Prison and Calton Hill.

VIEWS OVER WAVERLEY STATION, EDINBURGH.

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its name to the station), which is accommodated in buildings below these gardens adjoining Waverley Bridge and partially over the station at its western end. Beyond Waverley Bridge are the East Princes Street Gardens. These, together with the buildings on the Mound, the Scott Monument, the outstanding mass of rock upon which Edinburgh Castle stands, and other distinguishing features, combine to produce one of the views for which Edinburgh is famous.

The central block of buildings, and particularly the main booking hall, probably ranks as the most distinctive feature, apart from its unique lay-out, of Waverley station. The block is in form a rectangle, and extends from the main footbridge on the west, under the north bridge, to the eastern terminal lines, and embodies the north pier of the bridge. Two upper flats of offices, &c., extend along its north and south sides, with the space occupied by the booking hall, the pier and two long passages on each side of it coming in between. The upper flats on the north side are purely departmental, while those on the south side, in addition to district departments, have the quarters of the dining and refreshment-room female attendants.

High up in the centre of the west and east ends of the central block large clocks with translucent dials are placed, while another large clock is suspended over the centre of the main up platform.

At the east end of the central block is a wide circulating area, and at the west end considerable space, allowing for the fact that part of the space is taken up by a cab yard. On the up side there is also fairly generous platform space, though this has been narrowed somewhat by the fact that barriers have been erected so as to divide off a sufficient width immediately alongside the up main line for platform work. On the down side the space is somewhat wider, in that a cab yard is included, though there also the platform proper has been enclosed by barricades. Immediately facing the cab accesses from Waverley Bridge may be noted: to the left—that is, the north-west corner of the central block—a private entrance-way and lift; and at the south-west corner, a luggage hoist, communicating with an overhead passage directly into the North British Station Hotel, so that passengers need not go outside the station in passing from one to the other. Opposite is an excess luggage office, while further along are telephone kiosks, tobacco stall, &c., and on the down side a cab office.

Occupying a central position at the west end of the central block is the booking hall, notable for its fine mosaic floor, ornamental stone and wrought-iron work, its lofty glazed roof, in the centre of which is a dome, also glazed, which with the large windows in the west wall effectively light up the interior. The booking office is placed near the centre of this spacious hall and is octagonal in shape, its east and west sides being longer than the others, the massive oak cabinet work of which it is constructed being one of its distinctive features. It has 13 booking windows allocated for traffic on the various routes going south and east, and, on the whole, a very pleasing and artistic effect has been obtained.

Access is gained to the booking hall from the west by two entrances: from the up platform and down platform sides by passage-ways, paved in mosaic like the booking hall, and from the east by two long passages, paved in oak parquetry and lit from a glass roof; the north pier of the North bridge occupies the space between the passages.

Two clocks keep time in the booking hall —one on the north side, carried out from the wall on an ornamental wrought-iron bracket, and the other on the west wall; this latter is a synchronised clock and registers Greenwich mean time.

In the centre of the west side of the booking hall, on a stonework pedestal, is a life-size bronze statue of the late Mr. John Walker, a former general manager of the North British Railway. Adjacent are collecting models of the *Rocket* and of North British 4-4-2 locomotive No. 872, *Auld Reekie*, together with a model of N.B. Clyde steamer *Dandie Dinmont*.

In the centre of the east side is a large bronze war-memorial tablet, showing in raised characters the names of North British Railway employees who gave their lives in the Great War.

On the north side of the booking hall is the ladies' first-class waiting room, and in the north passage a general waiting room, as well as an entrance to upper-floor

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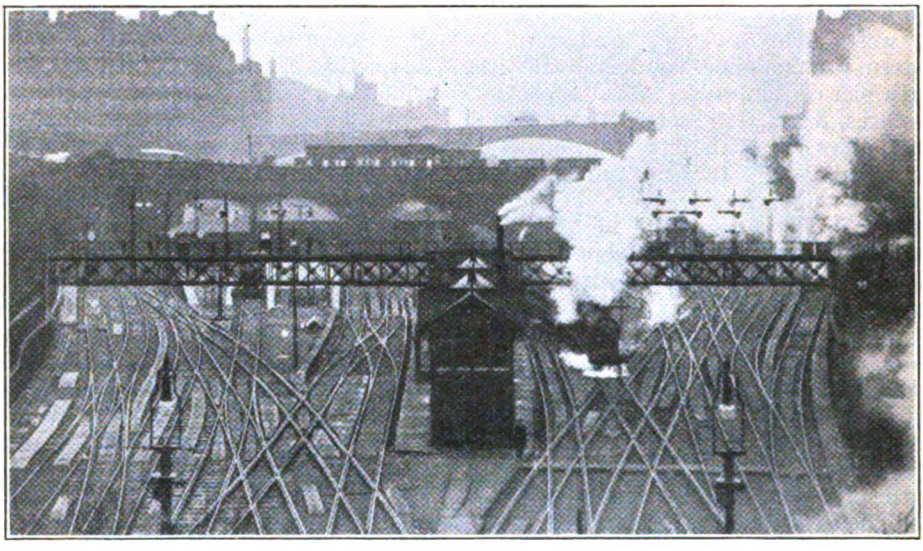
offices. On the south side of the hall there is an entrance to a seat and sleeping-berth booking office.

In the south passage are the enquiry, seat and sleeper, and season-ticket offices, also an entrance to upper-floor offices on this side.

Towards the main up platform may be noted a further entrance to upper floor offices, an L.M.S. enquiry office, left-luggage office, shop parcels and cloak-room department, telegraph office, a third-class refreshment room, and two hoists for the purposes of the General Post Office, with which they are connected by an overhead gangway. On the main down side are further waiting rooms, station-master's office, lost property office, and at the eastern end an extensive tea and dining room, balancing a first-class refreshment room occupying a corresponding position on the up side. At the eastern end there is a hoist and stairway leading to stores, &c., in the basement of the central block. Extending from the booking hall to the eastern end are the two parallel passages previously mentioned; speaking generally, these provide only for passenger movement, except for access to lavatories and to afford entrance off the north passage to a first-class refreshment room, and off the south passage, entrances to the station-master's office and the service room of the dining hall. Along the wall, facing the eastern terminal lines, may be noted a model North British 4-4-0 locomotive, utilised for collecting for the Railway Servants' Orphanage, while distributed round the central block, or at convenient places in the circulating space adjoining, may be noted confectionery and fruit, tobacco and book stalls.

At the west end the cab road connects the approach and exit slopes, extending also round for some distance parallel to the up main and down main platforms. On the down main side the cab road also parallels the central block for the whole of its length, thus constituting a cab yard conveniently adjacent to meet the needs of passengers arriving by down trains. Between the two cab slopes are two elongated octagonal buildings, involving neat cabinet work. One constitutes a western booking office, while part of the other is utilised for the main bookstall. Behind each are premises devoted to staff purposes, including, in one case, an auxiliary refreshment bar.

As will be noted from the plan, while the platforms at the eastern end terminate level, the arrangement at the western end is somewhat involved. Thus, Nos. 15 and 14 platforms are substantially shorter



[*Photo.* [*L.N.E.R.*

GLASGOW EXPRESS LEAVING WEST END OF STATION.

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than most of the others, in that their length is restricted by the girders supporting the ramp of the cab exit, and have to be reached *via* No. 13 or the down main platforms. Nos. 10, 11, 12 and 13 terminate behind the bookstall and booking office buildings previously mentioned, while No. 9 has two faces and terminates short, under the arriving cab ramp, so that it has to be reached *via* either No. 10 or the up main platform. Underneath the arriving cab ramp are buildings now devoted to the parcels and cartage luggage department, and the principal purpose of the cab yard on that side is to meet the requirements of that department; alongside is an ambulance shed and ticket collectors' room. On Waverley Bridge, between the two respective cab ramps, are further premises used by the parcels department. Under the ramp of the cab exit are stores, and on the south side a staff canteen, a parcels store, a cab office, and a luggage hoist communicating with a similar hoist on the suburban platform by an overhead bridge.

As the varying terminating distances of the western end bays would ordinarily reduce their length, this is partially compensated for by the fact that they extend westward for varying distances beyond Waverley Bridge. While the suburban platform has its main access from the footbridge across the station, it has, at the western end, as previously stated, a stairway direct from Waverley Bridge, and about midway along a footbridge connects with the down main platform.

It has already been mentioned that alongside the up and down main line platforms are two siding or auxiliary lines. These, however, call for a little further attention in explanation. On the down side the first non-platform line extends from end to end of the station. In fact, trains can, and do occasionally, work right through thereon without touching the platform, though its main purpose is to facilitate the transfer of through sections and shunting movements generally, and to enable a train to reach or leave either end of the main platform, even although another train occupies the other portion. The third line, directly against the wall, is actually used for storing certain special sets while out of service, though it can be, and is during the day, utilised also for operating purposes. On the up side there is also a long non-platform line, available for through running and marshalling operations if need be, and a third line which can be used in the same way or for storing empty

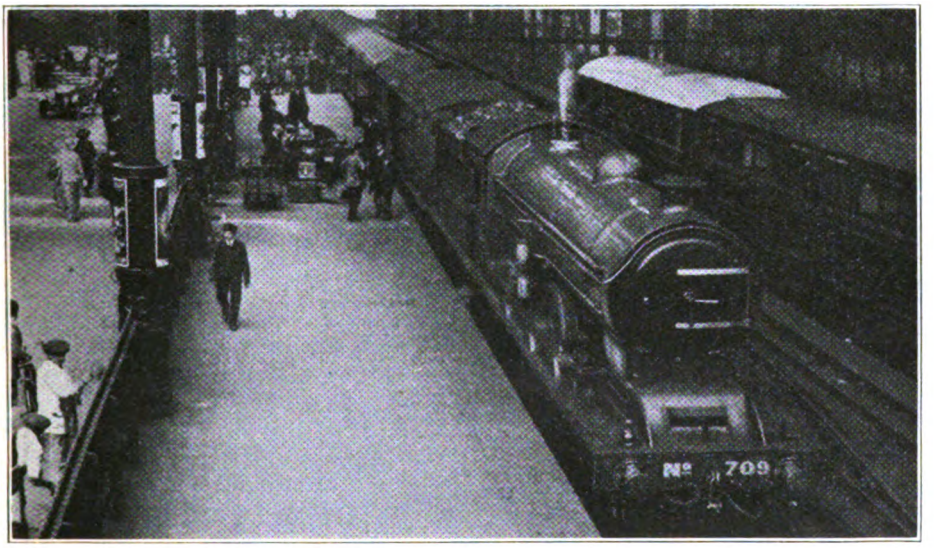

Photo.] [*L.N.E.R.*

EAST COAST EXPRESS AT DOWN MAIN LINE PLATFORM.

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coaches. Midway of the station, however, there is a fourth line, and, adjoining Waverley Market, three terminal spurs, which can be used for storage purposes. Towards the east end the auxiliary line gives access to a horse and carriage loading dock. Alongside the suburban platform are the shunting spurs relating to the goods depot, and these extend towards the east to serve a loading bank, grain shed and goods shed located within the space enclosed between New Market Street, New Street and the main station.

Crossovers are provided between each pair of terminal lines, both at the east and west ends, while between Nos. 1 and 2, 7 and 8, 10 and 11, and 12 and 13 are middle lines to enable engines to run round their trains without occupying another platform line, as is necessarily the case when the same operation is conducted at other platforms. This facility is useful in view of the fact that several local services are operated by engines and vehicles definitely allocated to a particular route, though on services requiring long trains, and usually those operated by tender engines, the coaches are taken out by another engine. Even then, however, the crossovers are useful, as they allow an arriving engine to be released in cases where its vehicles are not required for service again for some time.

Signalling at Waverley is controlled by five main boxes. The East box is the largest, having 260 levers, arranged in one long frame, this ranking as one of the largest signal boxes in the British Isles. The West box is of the same general type but rather smaller, having 204 levers only. For controlling mid-station movements there is a North Central box, mounted on the wall adjacent to that end of the main footbridge, so as to obtain a good view over the crossovers and connections for the control of shunting and marshalling operations at that side of the station. On the south side there is a corresponding signal box, known as South Central. Originally, the South Central box had an extension beyond the dividing wall to meet the needs of the suburban station, which would otherwise be out of view. This part has, however, been taken down and a small platform box provided on the suburban platform for controlling traffic there within station limits. The remaining box, under the control of the Waverley station master, is that at Princes Street Gardens, between The Mound and Haymarket tunnels. Mention may also be made of the fact that behind the buffer stops of platforms 5 and 6, and behind those

INTERIOR VIEW ON DOWN MAIN SIDE SHOWING CAB YARD AND INTERMEDIATE SIGNALS.

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of platforms 12 and 13, Benn & Cronin train indicators are erected, respectively for the eastern and western ends of the station. These are not, however, of the usual time-table type, though designed on the same lines, their purpose being to show the platforms from which trains start, and the stations at which they stop *en route*. This is greatly simplified in view of the fact that, as far as possible, particular platforms are allocated to particular routes, so that lists of stations can often be left standing with little modification, except for alteration of train time, for considerable periods.

Speaking generally, it may be said that Waverley station deals with about 1,000 trains in the course of 24 hours. This number has been somewhat reduced of recent years, owing to the fact that, except at periods of business travel and to meet the needs of the lunch-hour traffic—a considerable item—inner-suburban services have been considerably reduced, for the reason that the Edinburgh tramways serve so many of the same districts. This has, however, been counterbalanced by increases in outer-suburban trains and particularly on the main line side. It has to be borne in mind, too, that traffic at Waverley is much more complicated than at an ordinary terminal station, in that so many trains involve re-marshalling and frequently transfers between terminal and through lines, as well as attachment, detachment and re-combination. In fact, at times, all four of the engines allocated for shunting duties are simultaneously busily employed, while train engines not infrequently have to take their share in the carrying out of re-marshalling operations. Consequently, in conjunction with the changing of engines in the case of the very few long-distance trains which work through intact, a very large part of the work of the station is of a more or less complex character. It is true that the practice of running trains through between east and west of Edinburgh has been extended of late years, as in the case of Edinburgh and Glasgow expresses which actually run to or from Leith Central, or from further destinations such as North Berwick and Gullane for the Lothian Coast expresses. Enough remains, however, allowing also for the frequent attachment of fish vans and so on to principal expresses, to render Waverley one of the busiest stations in the kingdom, as well as one of the most complex to work. Attention has also to be paid to supplying the needs of restaurant cars and sleeping cars as used for so many principal expresses, the former including not only the Anglo-Scottish through

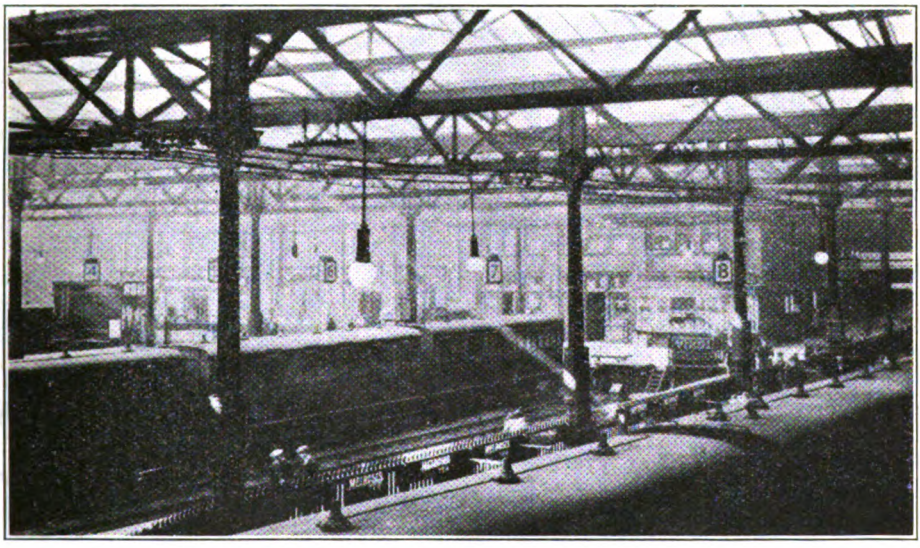

Photo.] [*L.N.E.R.*

INTERIOR VIEW OF BAY LINES (EAST END).

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trains, but also services such as those between Edinburgh and Aberdeen, and Edinburgh and Glasgow. The working of through coaches, such as those between Glasgow and Aberdeen and Leeds, Penzance, Southampton and other destinations of a special character, may also be mentioned.

Considering the train services handled at Waverley, there are several special features attaching to the full summer arrangements which render it desirable to base remarks on the services then in force, though at such times circumstances are, necessarily, more liable to call for alterations, in that duplication, division and relief are often called for, while the possibilities of late running, probably due to conditions a hundred or so miles away, and consequent complications are also greater.

As a 24-hour station, open from Sunday evening until the next Sunday morning, there being a few hours that day when it can be actually closed, the day runs from midnight to midnight, and the first really busy period is that between 3 and 4.30 a.m. At this time the principal night expresses from London to the north come along. One or two are not publicly booked to call at Waverley, but must do so, for engine changing, even if the through sections are run—as may occasionally be necessary—as separate trains. The real point is that they are not booked for passengers from London and other English stations (who have other trains), in that there are full loads for destinations beyond. But the divisional trains formed after re-marshalling do appear, as there may be a few passengers joining at Waverley, even at this early hour.

At 3.35 a.m. the 7.25 p.m. from King's Cross is due at the main down platform. The principal part leaves at 3.48 a.m. for Perth, taking the Inverness sleeping cars and through carriages, the Glasgow and Fort William sleeping cars and through coaches being left for combination with vehicles brought by the following train. At 3.50 a.m. the 7.40 p.m. from King's Cross is also due at the same platform, east end, the Aberdeen portion leaving at 4.5 a.m. with the London-Aberdeen and Elgin and Lossiemouth sleeping cars and through carriages, also the through vehicles from Penzance (via Plymouth, Swindon, Leicester and Sheffield). The Penzance-Glasgow coaches are then combined with the Glasgow section of the preceding train, together forming the 4.30 a.m. express to Glasgow, including the Fort William sleeping cars and through coaches.

By Courtesy.] [*Benn & Cronin Ltd.*

TRAIN INDICATOR AT WEST END.

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A short respite and the same platforms are again busy with the second series of night expresses from the south. At 6.6 a.m. a useful through train from London (8.25 p.m.) is due. This has no sleeping cars, but is a busy train, in that it calls at most principal stations and, incidentally, handles a good deal of luggage and miscellaneous traffic, some in through vans to go forward later. The chief pressure is, however, associated with the trains due at 7.5, 7.15 and 7.30 a.m. The first is a night sleeping car express from St. Pancras via the Waverley route, having through coaches from London (with sleeping car) and Bristol to Edinburgh, but also including through coaches from London to Dundee and Aberdeen.

Ten minutes later, at the same platform, the 10.25 p.m. train from King's Cross is due, though this does not rank as a train for Edinburgh. Its Dundee through coaches and sleeping car, combined with the Aberdeen coaches brought by the St. Pancras train, are then transferred to another platform to form the 7.35 a.m. Aberdeen express, its Perth coaches attached to the 7.29 a.m. train, and the Glasgow section to the 7.35 a.m. for Glasgow. All three sections include sleeping cars, and both the Aberdeen and Glasgow trains have restaurant cars added. These trains can be booked away simultaneously, owing to the four-track lay-out to Haymarket as far as Saughton, the diverging point. At 7.30 a.m. the Edinburgh sleeping-car express from King's Cross is due, the main down platform being cleared for it by that time.

No further East Coast expresses are involved until 1.44 p.m., when the Leeds–Glasgow restaurant-car express, with a through carriage from Sheffield (Victoria), is due, leaving again for Glasgow at 2.5 p.m. Connections are, however, made with the 2.5 p.m. for Perth and Inverness and the 2.11 p.m. for Aberdeen. A further respite, in this connection only, until 6 p.m., the 9.50 a.m. (Edinburgh only) from King's Cross being due at 6.5 p.m., the 9 a.m. from St. Pancras at 6.10 p.m. and the 10 a.m. "Flying Scotsman" at 6.15 p.m. The St. Pancras train has through coaches for Aberdeen, transferred from No. 1 platform for combination with the Aberdeen part of the 10 a.m. from King's Cross, due away at 6.32 p.m. The London–Glasgow portion goes on at 6.30 p.m., and the Perth coaches at 6.38 p.m., involving a considerable amount of re-marshalling, especially as the 9.50 a.m. from King's Cross cannot be removed before the arrival of the 10 a.m., seeing that it always brings a considerable amount of luggage and is a popular train in itself, albeit actually a relief to the "Flying Scotsman" proper.

Now due at 7.35 p.m., but until recently at 7.50 p.m., the popular Pullman car express from London arrives, a train which, after it has unloaded its Harrogate passengers, still has a fair load for Edinburgh, with a number added on the way. This completes its duty at Waverley and is usually put away, with the stock of the 9.50 a.m. from King's Cross, on the wall siding on the down side. Then at 8.48 p.m. the main down platform is required for the afternoon Leeds–Glasgow express, bringing also through carriages off the 11.50 a.m. from King's Cross and through coaches from Harwich, Scarborough and Southampton to Glasgow. Speaking generally, however, this has had most of its re-marshalling *en route*, so that, except for the detachment of a van or so, it can go forward more or less intact as the 9 p.m. express for Glasgow. At 9.4 the 11.50 a.m. from St. Pancras is due at No. 1, and at 9.40 p.m. the day series of East Coast expresses is completed by the arrival of the 1.15 p.m. from King's Cross.

On the up side similar work is involved, but differently arranged, the first pressure commencing at 9.30 a.m., though at 8.30 a.m. the up Pullman car express for Harrogate and London leaves No. 2 platform. Round about 10 a.m., however, Waverley is very busy on the up side making up and despatching the 10, 10.5, and 10.15 expresses. The 10 a.m. itself (the up "Flying Scotsman") includes a section off the 6.10 a.m. from Aberdeen (due 9.40 a.m.), together with the Edinburgh–London coaches, while during last summer the 10.15 actually took on the section from Perth at 8.35 a.m. and that from Glasgow at 8.40 a.m., though usually they constitute part of the 10 a.m. itself. When the 10.15 does not work through to London, as is the case during the winter months, they are combined with the 10 a.m. itself at York and not at Edinburgh.

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The 10.15 a.m. also conveys through coaches from Glasgow to York, Harwich and Southampton, while the 10.5 a.m. to St. Pancras takes on through coaches off the Aberdeen train.

The 1.15 and 1.45 p.m. trains for the south, with the 1.40 p.m. to St. Pancras, involve another series of train combinations, the 1.15 p.m., normally a Glasgow-Leeds express, taking on through coaches from Glasgow to Leeds, Penzance, Southampton and London (King's Cross), though it partially interchanges later with the 1.45 p.m., which takes the Aberdeen-Penzance, and the Aberdeen and Perth to London sections, arriving at Waverley at 1.23 and 1.30 p.m. respectively. In this case the 1.40 p.m. to St. Pancras has no through section from the North.

At 5.2 the Glasgow-Leeds restaurant-car express is dealt with at the main down platform, leaving at 5.12 p.m., and at 5.52 p.m. an express leaves on the up side, this including a through carriage for Bristol. At 7.45 the night series commences with a useful semi-fast train for King's Cross, but the real pressure is associated with the trains due at 9.23 p.m. from Aberdeen (with through coaches for the 9.55 p.m. to St. Pancras), and those due at 10.31 p.m. from Inverness and Perth (going forward at 10.50 p.m. with Dundee coaches which come in at 9.23 p.m.); also the 10.45 in from Glasgow and the 10.49 in from Aberdeen which go forward at 11.5 p.m. This departure is not advertised, as Edinburgh people have already been despatched at 10.25 p.m., which is, primarily, the sleeping-car express for Edinburgh traffic, to King's Cross. To handle these trains involves use of both down and up main platforms, though the arrangements are subject to modification at different periods.

Although thus described with relative simplicity, it is necessary to emphasise the fact that many of the trains concerned are heavy on their own account, and that frequently further vans for luggage and for the conveyance of fish, besides passenger coaches added for journeys north or west of Edinburgh, complicate traffic operation.

A few remarks may here be added as to certain other trains on the main routes. Thus, on the down side, the Lothian Coast express is dealt with at 8.45–8.50 a.m., and the corresponding service on the up side at 1.26–1.30 p.m. on Saturdays and at 4.50–4.55 on other days. Mention may be made also of the period excursions provided for from Waverley to England by the East Coast route at 9.30, 9.45 and 10 p.m., on Friday nights, and passing through on Saturday mornings at 3.5, 3.16, 6.15 and 6.25, or as many as are required.

There are, of course, expresses on various routes, apart from those associated with the Anglo-Scottish through travel, of which the following (including the through services) may be mentioned:—

From Edinburgh.

To—	
Aberdeen ..	4.5, 7.35*, 10.2 (S.O.), 10.15* (through coach to Lossiemouth), 12.52 (S.O.)*, 2.11*, 4.25*, 6.32*, and 8.10 p.m. (to Dundee only).
Perth (and Inverness)	3.48 (Not Mondays), 4.21 (Mondays only), 7.29, 10.7, 2.5, 6.33 and 9.25.
Glasgow ..	4.30, 6.25, 7.30 (Mondays only), 7.35*, 8.50, 9.5, 10.5 (through carriages to Fort William and Mallaig), 12.10 (S.O.), 1.0*, 1.50 (S.O.), 2.5*, 4.0*, 5.5, 6.23 (S.O.), 6.30*, and 9.0*.

Several of the Glasgow trains work from Leith (Central). Further, the 12.50 (S.O.) and 9.30 p.m. via Bathgate give good services to Glasgow, Queen Street (Low Level), the former running through to Craigendoran and Helensburgh to connect with Clyde steamers and the latter to Milngavie.

Due in Edinburgh.

From—	
Aberdeen ..	9.40*, 1.23*, 2.6 (S.O.), 4.10 (S.O.), 4.14* (through carriage from Elgin), 7.12 (S.O.), 7.27*, 9.23†, and 10.49*.
Perth	9.59, 1.30, 4.54 (from Inverness and Forres), 9.34 (through coaches from Inverness), and 10.31.
Glasgow ..	8.57*, 9.47*, 11.22, 12.57 (Wednesdays and Saturdays), 1.7*, 1.26 (S.O.), 1.57 (S.O.), 2.3*, 3.6 (S.O.), 3.16 (S.E.), 3.20 (S.O.), 4.50 (S.E.), 4.52 (S.O.), 5.2*, 6.7*, 7.17*, 9.24, 9.34, 10.45, 11.46 (S.O.).

Also from Glasgow via Bathgate, due in at 9.40, 5.9, 7.21 and 9.23.

* Including restaurant cars.
† Including restaurant car on Saturdays only.
S.O. = Saturdays Only.
S.E. = Saturdays Excepted.

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Hitherto attention has been given mainly to summer arrangements. A large proportion of the trains mentioned, however, run all the year round, so that most of the references made above still apply, except for purely summer facilities.

Besides these trains there are considerable numbers of trains on various routes, most terminating, though a few, including particularly the Circle trains on the South side line, principally dealt with in the suburban station, work through between east and west. As a rule, these various trains run in series for the morning pressure, homeward in the evening or on Saturday afternoons, and outward and return to meet the needs of the mid-day lunch traffic.

The platforms are, in the main, allocated to particular services. The following list gives their lengths, together with a few necessary remarks.

	Ft.	
Main up ..	1,607	Principal expresses.
Main down ..	1,567	Principal expresses.
No. 1 ..	549	
No. 2 ..	466	
No. 3 ..	467	
No. 4 ..	473	
No. 5 ..	480	
No. 6 ..	480	
No. 7 ..	492	
No. 8 ..	485	
No. 9 ..	510	north face.
	520	south face.
No. 10 ..	664	
No. 11 ..	516	
No. 12 ..	516	
No. 13 ..	628	
No. 14 ..	339	
No. 15 ..	408	
Down suburban	1,129	
Up suburban..	1,129	

In addition to the standard train services, it must be remembered that, throughout the greater part of Scotland during the summer months, the month-ends involve a great deal of special pressure, owing to the fact that so many holiday-makers take up or leave their summer quarters round about the first of the month. At such times, therefore, it frequently occurs that considerable numbers of relief trains have to be run, some appearing in the public time-tables, but, otherwise, the subject of special announcement, while combined trains nearly always require to be run separately. Such pressure applies, too, in a number of directions, affecting especially trains running to the Fife Coast resorts and across to Glasgow to serve the Clyde resorts.

Photo.] [*L.N.E.R.*

MR. DAVID ARCHIBALD,
Stationmaster.

There is also a substantial amount of pressure on trains to and from the Lothian Coast, and on routes serving the favourite hill and country districts, and to and from the Highlands and Aberdeen. The various town holidays, too, add greatly to the traffic dealt with at Waverley station, in that visitors from several other big centres —notably Dundee, but also, to a great extent, Glasgow and other towns—regard Edinburgh as a very suitable holiday centre, both for a stay of some days or a week and for day trips. As there are quite a number of places having considerable populations within easy reach of Edinburgh, the result is that Waverley has quite a number of such periods of pressure, apart from its own holidays, when as many as 50,000 or even more passengers may have to be conveyed away and brought back again.

A feature of the standard traffic dealt with at Waverley station is that, while season tickets are less numerous than at a corresponding station in England, very large numbers of zone tickets are issued at stations within a few miles' radius.

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These cover unlimited travel within the area specified from Monday morning until Saturday night, and on Sunday, where a train service is available, at very reasonable rates. They are largely utilised by passengers of the class who take out season tickets in London and other English towns, where zone tickets are not in operation, and are used not only for morning and evening journeys into town and home again, but also for mid-day lunch-hour journeys.

It must be remembered, too, that while local goods traffic only is dealt with at Waverley, and then at the adjoining goods station, a considerable amount of fish and other special traffic is operated in connection with passenger trains, including, frequently, the attaching of fish vans and the like, even to principal expresses. This traffic may add to the marshalling work involved, though, as far as possible, special fish trains are run, some of these being booked to avoid Waverley station.

Necessarily, a station of the magnitude of Waverley involves a considerable staff. Under Mr. David Archibald, station master, there are three assistant station masters, Messrs. J. Reid, A. Pringle and A. Murray; 10 platform inspectors, 11 clerks, 1 ticket inspector, 4 yard foremen, 10 station foremen, 9 goods guards, 30 passenger shunters, 32 signalmen, 4 train register boys, 1 gatekeeper, 2 pointsmen, 2 foremen ticket collectors, 4 travelling ticket collectors, 38 ticket collectors, 58 porters, 12 parcels porters, 2 porter-guards, 11 lampmen, 6 lampboys, 3 East Coast train attendants, 3 carriage cleaners, 6 waiting-room attendants, and 2 office cleaners.

The booking staff, consisting of 25, is under Mr. J. Brown, while Mr. W. Davidson, with a staff of 32 clerks and 77 porters, is Parcels Agent. Similarly, Mr. A. Strachan is Goods Agent. These gentlemen are attached to the Commercial Department, while the season ticket office, cloak room and lost property office are directly under Mr. M. S. Strang, Passenger Manager, Southern Scottish Area. The dining and refreshment rooms come under the Hotels Department, while certain other grades of staff are attached to the Carriage and Wagon and Locomotive Departments, usually with a foreman in charge. It will be noted from the particulars given above that a considerable number of passenger guards and several goods guards are attached to Waverley station.

Mr. David Archibald has held the position of station master at Waverley since 1914, when he succeeded Mr. Maitland. He came to Waverley, however, in 1907, as Assistant Station Master, transferring to Edinburgh after holding positions as station master at Fort William and North Berwick.

In conclusion, the writer may acknowledge his indebtedness to Mr. Archibald and members of his staff for assistance iu collecting material for this article, as also to Mr. J. Calder and other chief officers of the Scottish Area and in London of the L.N.E.R.

LOCOMOTIVE AND TRAIN WORKING IN THE LATTER PART OF THE XIXTH CENTURY.

In the February Number Mr. Ahrons will deal with the Dublin, Wicklow & Wexford Railway.

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Photo.] [*J. F. Gairns.*

GLASGOW PULLMAN OBSERVATION CAR EXPRESS AT OBAN.

To Oban via Perth and Crieff.

By J. FRANCIS.

THE formation of the London Midland and Scottish Railway has brought under one ownership two of the three great scenic main lines which penetrate the Scottish Highlands, the Callander and Oban, and Highland lines, the third being the West Highland section of the L.N.E.R., though there are, of course, many other sections of both systems which require to be classed with them, in regard to scenic attractions, if not in respect of main line characteristics. But while the other two have to be considered on a throughout basis, the Callander and Oban line has the peculiarity of a triple approach route. Each of these, moreover, counts for a great deal from the scenic point of view, and in this article the routes from Perth via Crieff and from Gleneagles to Crieff receive primary attention, though further remarks are included as to the Oban route as a whole, supplementing the article thereon published in the July, 1923, number of the RAILWAY MAGAZINE.

The Gleneagles (until recent years named "Crieff Junction")-Crieff line dates from quite early days, as both this section and the Dunblane, Doune and Callander line were associated with the Scottish Central Railway before it was amalgamated with the Caledonian Railway in 1865. The same, in fact, applies to the Perth, Almond Valley and Methven Railway, leaving the then Scottish North Eastern Railway, and for which Parliamentary powers were obtained in 1856, the extension from Methven Junction to Crieff being completed in 1867. The Dunblane and Callander and Crieff Junction–Crieff lines were constructed under powers granted in 1856 and 1853 respectively. Subsequently, the line was extended from Crieff to Comrie, though the remainder of the route is of later date, the Comrie–St. Fillans portion being opened in October, 1901, St. Fillans to Lochearnhead in July, 1904, and the last link, to join the Oban line at Balquhidder, in 1905. Originally, the station at Balquhidder, on the Oban route, was known as Lochearnhead, but when the branch was completed that name was transferred to the present station used by trains to and from Crieff, the Oban line station, rebuilt on a new site to suit the junction entailed, taking its present name. The construction of

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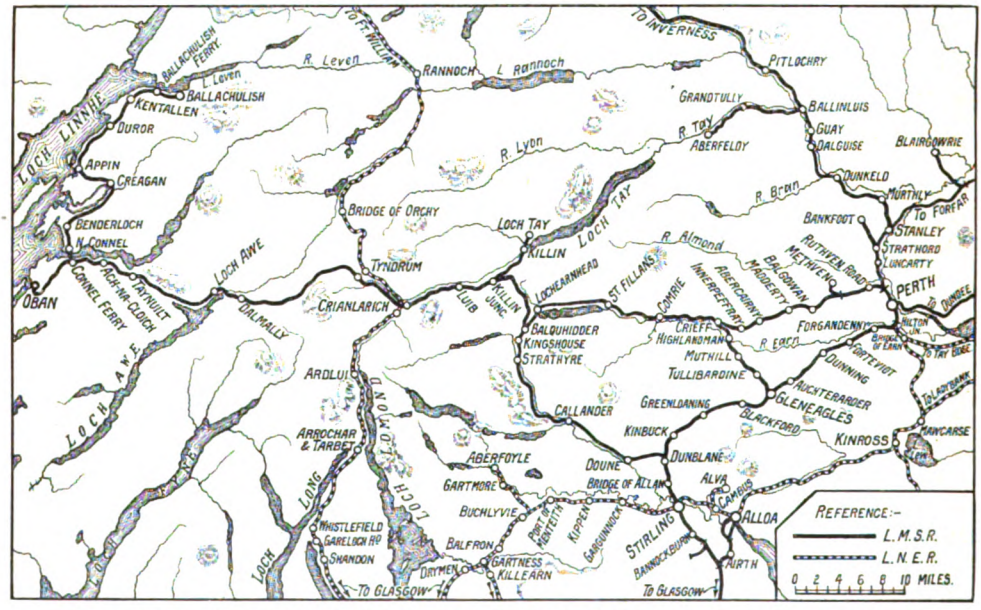
the Comrie Balquhidder section was described in the August, 1904, RAILWAY MAGAZINE, while reference may also be made to articles by Mr. G. W. J. Potter in the August and September, 1912, numbers.

Although the completion of the route from Crieff through to Balquhidder is a matter of comparatively recent date, the Crieff branch from Gleneagles has for many a year been a comparatively busy one. Indeed, long before the little station known as Crieff Junction blossomed out with the new and now well-known name of Gleneagles, and when there was no many another little "Junction" station which owes its later development to the fact that it was erected for junction purposes.

In view of the fact that the Gleneagles golf courses were already in full swing, an entirely new station was put in hand some years ago. This, "Built in 1919, the year of the peace after the Great War," as the commemorative stone intimates, is of exceedingly handsome design, while the arrangement of the track lay-out and station facilities are everything that could be desired. There could, indeed, be no greater contrast than that between the old



MAP SHOWING CALLANDER AND OBAN LINE, CONNECTIONS AND BRANCHES.

thought of the world-famous golf courses or of the magnificent Gleneagles Hotel, with its manifold and in many respects unique attractions and facilities, there was a considerable amount of interchange of traffic between main line and branch trains, in addition to the through working of certain trains or of through carriages. There was, it is to be presumed, a village at the junction, and the name Gleneagles may have been known locally in those days. But the real purpose of the station was to serve the branch to Crieff, and, in default of any occasion to use a local name, it took that of the town, nine miles away, to which it gave access, as in the case of station—Crieff Junction, as it then was—and the new Gleneagles. Previously the station consisted of a set of old wooden buildings situated on the up line side and on the island and down branch platforms. The platforms were low and short, an overbridge from the up to the down main lines was not used so much as level crossings at the platform ends, and other level crossings provided the only means of passage from the down main line platform to the down branch platform and of communication between the station and the public road.

The remodelling of the station facilities necessitated far more than the building of

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the station. Previously the branch line to Crieff crossed the main public highway from Glasgow to Perth on the level some 200 yards from the station, this involving the constant attendance of a crossing keeper and irritating delays to road traffic, while the main outlet from the station to the highway was by means of a sunken roadway, which was something of a quagmire in wet weather. The level crossing has been abolished by diverting both the highway and the branch line, so that the road is now carried under the line, and the change has also been of great advantage to the junction working.

The approach roadway, which from the public road to the entrance hall is some 400 yards in length, forms what must be one of the finest station-approach roads in the kingdom. It begins on the public highway at a point opposite the junction of the private road from the golf courses. The entrance to the avenue is semi-circular, rendering easy the passage of vehicles from and to the public road in both directions. The avenue consists of a road and footpath, flanked by a substantial white-painted four-bar fence, immediately behind which are rows of trees with suitable shrubs interposed.

The station entrance hall, into which the avenue leads, is built in the Scottish baronial style, with crow-stepped gables and miniature turrets. On one side there is a commodious booking office and a parcels office, and facing the entrance is the overbridge leading to the platforms. A train information board is provided on the overbridge to enlighten passengers as to the time and departure platform of their trains. The continuation of the overbridge to the up line side is covered in, and opposite the top of each of the stairways are alcoves containing flowering plants and shrubs.

The buildings on both platforms are solidly built and of handsome appearance. Those on the island platform include stationmaster's room, waiting room, &c., and porters' room. In the passage dividing the buildings are located a fruit-stall and bookstalls. The rooms on the up side consist of ticket collectors' and waiting rooms. The signal-box is situated at the north end of the island platform. It may be added that the platforms and the adjoining bank on the up line side are tastefully laid out in walks and plots, and their pleasing appearance is reflected in the fact that Gleneagles was awarded a first-class premium in the best-kept station competition.

The bulk of the passenger traffic for and from Auchterarder—a holiday resort a mile to the west of the main line—is dealt with at Gleneagles, which also serves the widely scattered district to the south. It also deals with the traffic to the increasingly popular resorts of Crieff, Comrie, St. Fillans and Loch Earn, most of which, however, is conveyed in through carriages from Glasgow, Edinburgh, &c.

The Gleneagles Hotel was illustrated and described in the September, 1924, number of the RAILWAY MAGAZINE. It is a magnificent building, designed to harmonise with its picturesque natural surroundings. Accommodation is provided for about 300 visitors. In addition, there are about 100 bathrooms, a swimming pool, and a garage with accommodation for 100 motor cars, with facilities for the purchase of motor accessories and for the carrying out of light repairs. Other special features of the hotel are a ballroom with stage, and a grand corridor in which the Gleneagles dance bands perform as required, together with postal, banking and other facilities. Central heating, electric lighting and electric lifts are installed, while there is also a wireless equipment, by arrangement with the British Broadcasting Company.

The branch leaves directly at the west end of the station, and is single line, with stations at Tullibardine, Muthill (crossing), and Highlandman in the course of its length of 9 miles. It passes through attractive scenery, particularly near the peculiarly named station of Highlandman, where it crosses the River Earn. About a mile before reaching Crieff station connection is made with the route from Perth via Methven Junction. The station has separate platforms, with a middle line between, and neat buildings, well-covered platforms and attractive platform gardens and floral adornments. The goods yard, engine shed, and other premises are all at the east end. Crieff claims to be the most picturesquely situated hill town in Scotland. Whether this is true or not, it has become a very popular health resort, being situated on the southern face

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of a hill called "The Knock," and sheltered from cold winds, while it is a splendid centre for touring, historic and antiquarian interest. It is, by the way, the second largest town in Perthshire.

Before continuing further, it will be convenient to consider now the later route from Perth to Crieff via Methven Junction. This leaves the L.M.S. main line to Aberdeen about a mile from Perth, at Almond Valley Junction. There it becomes single-track. The first station, Ruthven Road Crossing, is a small one of an intermediate character, at which only certain trains call, others making their first stop at Almondbank, 4 miles from Perth. Here there is a single platform on the up side. Then comes Tibbermuir Crossing, also omitted by many trains, after which a station which does not appear in the public time-tables is reached. This is Methven Junction, erected solely to provide for connections with the branch line to Methven. This branch was, in fact, the original line, though it lost its importance when the extension to Crieff left it at the junction. The branch is now worked by a small tank engine and two or three coaches, the train making one or two journeys through to Perth on Saturdays in addition to its usual duty of maintaining connections. The junction station has two through platform lines, as it is adapted for crossing trains, with a side platform for the branch train.

So far, although the River Almond is a near neighbour, the scenery passed is fairly ordinary in character, but as the journey is continued it becomes prettier, though not, as yet, calling for special remark. Balgowan is a non-crossing station, Madderly has the usual two platforms, and Abercairny and Innerpeffray single platforms only. All have station gardens and rank among the many neat station erections characteristic of so much of the late Caledonian system. Soon after leaving Innerpeffray station, not far from Highlandman on the Gleneagles line, connection is made with the latter route, which is common for both services of trains thence to Crieff, where connections are made when one route has a through train for beyond Crieff and one a train terminating at Crieff.

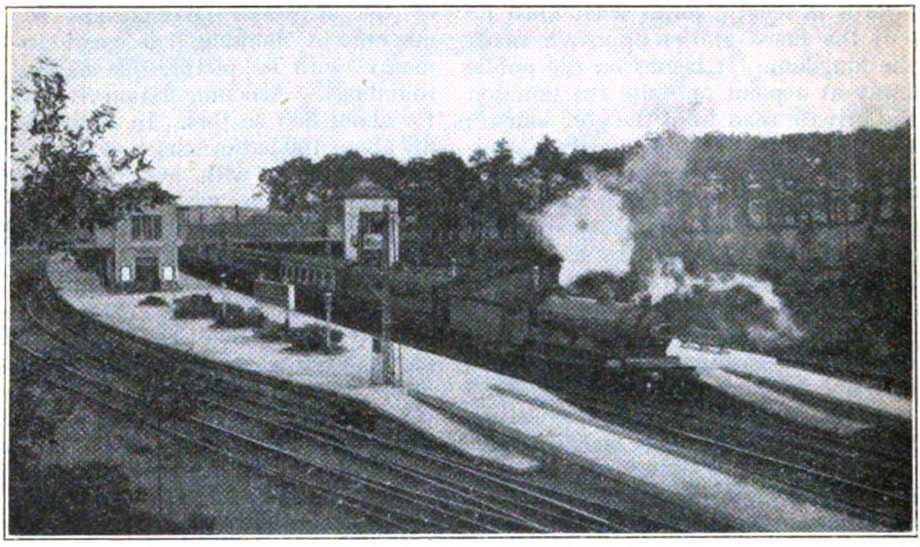

Photo.] [*Rev. J. S. Caddick-Adams.*

LONDON EXPRESS AT GLENEAGLES.

It is however, after leaving Crieff that the scenic beauties of the route are most manifest. The first stage is of six miles, to Comrie. After passing through a short tunnel, the River Earn joins company, the scenery of its picturesque valley accounting for much of the beauty of this run. About two miles after leaving Crieff, the line passes close to Tomachastle Hill, on which

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is an obelisk to the memory of General Sir David Baird, who overthrew Tippoo Sahib at Seringapatam at the close of the 18th century. Continuing in close company with the River Earn, and with many attractive views, diversified by glimpses of the mountains as they are approached, the train soon pulls up at the town of Comrie, another hill resort, having favourable climatic conditions all the year round, sheltered by wooded hills in the immediate vicinity and by mountains to the north and west. The station is in keeping with the characteristic features of Caledonian station practice.

Just beyond, a loop of the River Earn is crossed by a girder bridge, with road bridge alongside. Here a glimpse is had of a monument to the First Lord Melville on the summit of Dunmore Hill, above the town of Comrie. Two and three-quarter miles from Comrie is Dalchouzie Platform, at which trains call as required. This is located in a wood among pretty surroundings, which continue all the way to St. Fillans, still in company with the River Earn, which is crossed again on this stage. The combination of well-wooded and picturesque hill and river scenery near and the bare wildness of the mountains which are being approached make effective contrast.

St. Fillans is a pretty village possessing many facilities for permanent and holiday residence, and is located at the east end of Loch Earn. It is beautifully situated in the valley of the Earn as it joins the Loch. The next stage is, however, the scenic *piéce de résistance* of the route, in that for the next seven miles the line follows the shores of Loch Earn practically from end to end, the Loch being first seen as the railway curves round its eastern end and then, section by section, amidst its mountain surroundings.

Construction of the railway was, however, a costly undertaking. The first half-mile involved heavy rock cuttings and tunnellings ; one and a quarter miles from St. Fillans a viaduct spans a ravine, where a glimpse is had of a waterfall of substantial character ; and other and smaller ravines are met with until the gradient eases and the line continues at about 130 ft. above the level of the Loch for the next mile or so. The railway then descends, still on a track cut out from or built upon the rocky surroundings of the Loch, until at the point where it crosses the Beich Burn, it is only 40 ft. above water level. It climbs again to a height of 100 ft., and then falls to cross the end of Glen Ogle by the famous Lochearnhead Viaduct. This is curved, so that the passenger has good views of its nine arches of 40 ft. span, both approaching and leaving.

BALQUHIDDER STATION.

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After crossing the viaduct, Lochearnhead station, with its neat island platform, is reached, tickets being checked in the case of trains for Balquhidder. The final section, including a rather heavy grade to reach the level of the Oban line, involves the crossing of Channdroma Water by a viaduct of seven arches of 40 ft. span and a steel girder span of 80 ft. The present Balquhidder station, which replaced the earlier one from which Lochearnhead station took its name, has a long and wide island on the up side, so that branch trains can be dealt with on its outer face, and a single platform on the down side, with sidings, engine shed, etc., adjacent.

Crieff, where connection is made with the trains from Perth, which usually provide for journeys throughout. The Perth route has four trains through to Balquhidder and a fifth on Saturdays, while there are three (on Saturdays four) others between Perth and Crieff. Further, several of the Perth trains are more or less fast between Perth and Crieff, notably the 8.30 and 10.10 a.m., which are non-stop, and the 5.22 p.m., which has only a conditional call at Almondbank. Similarly, in the opposite direction, the 8.30 a.m. from Crieff calls only at Almondbank, and the 12 a.m. and 1.30 p.m. from Balquhidder which make the non-stop run between Crieff and Perth.

PERTH-BALQUHIDDER TRAIN AT CRIEFF.

In that the routes from Gleneagles and Perth to Crieff and beyond are in the nature of branches, the trains consist of coaches of ordinary and normally older types, except that a few through carriages run between Glasgow and Crieff, and as the gradients are frequently severe, 0-6-0 goods engines are usually employed, though occasionally 4-4-0 tender and 0-4-4 tank engines are to be met with on the shorter runs. Between Gleneagles and Crieff there are 12 or 13 trains each way daily, some being booked to call at Tullibardine and Highlandman conditionally only, if at all. Three of these trains are extended to St. Fillans, three others to Comrie, and one through to Balquhidder, the remainder terminating at

Although the direct line from Dunblane to Oban was described in July, 1923, the whole route is one of so surpassing interest that a few further remarks may appropriately be added, in that there is much to be said for making the journey to Oban via one or other of the routes described as an alternative to the Callander–Balquhidder route. This should only be done one way, however; otherwise, the traveller who makes his first journey would miss the many outstanding scenic beauties of the Callander line south of Balquhidder, especially the stretch alongside Loch Lubnaig and through the Pass of Leny.

Leaving Balquhidder, the Oban line

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climbs steeply into Glen Ogle, overlooking the descending route to Lochearnhead, already described, ere it turns eastwards, and giving a splendid view of Lochearnhead Viaduct and along Loch Earn from the lofty vantage point reached in a couple of miles or so. Glenoglehead is an intermediate crossing place on the run to Killin Junction, approaching which a view is had of the little town of Killin, at the end of Loch Tay, and the branch line therefrom which joins the Oban line at the junction. At Crianlarich passengers can interchange with the West Highland trains of the L.N.E.R., and after passing under that line the Oban route continues on one side of Strath Fillan, with the West Highland line on the other side.

After leaving Tyndrum no more is seen of the West Highland line, and Oban trains continue through Glen Lochy to Dalmally (a refreshment station), alongside Loch Awe, through the Pass of Brander to Taynuilt and onwards to Connel Ferry. The waters of Loch Etive have been in sight for a mile or two, and as the station is neared a good view is had of Connel Ferry bridge carrying the Ballachulish branch across the Loch. Then a steep climb to Glencruitten, a crossing place, after which a zigzag and curved descent, including fine views over Oban bay and town, leads to the ticket collecting platform, and so to the pretty station which terminates the route.

It is hardly necessary to say much about Oban, probably the most distinctive of all the more northerly holiday resorts of Scotland. It is a fair-sized place, with many hotels to suit all purses, besides boarding houses and apartments. From the pier numerous steamer services are operated, local or to the Inner and Outer Hebrides, while motor road touring is well catered for. Excursion fares, on a cheap and convenient basis, are in operation wherever justified on the railway route, while several combined rail and road or rail, steamer and road tours are operated during the holiday months. One of the most interesting of these is a "Grand Circular Tour" by motor from Oban to Ford, via the Pass of Melfort, steamer to Loch Awe Pier and train back to Oban, or *vice versa*. An alternative is by train from Oban to Loch Awe and steamer to Ford, returning the same way, the day cost of which is seven shillings only.

Photo.] TRAIN CROSSING CONNEL FERRY BRIDGE. [*E. A. Gurney-Smith.*

The Oban line has, in summer, quite a good train service. The first is the 5.50 a.m. from Stirling, conveying through carriages and sleeping car from Euston the previous night. This reaches Oban at 9.26 a.m. The next is the 8.50 a.m. from Stirling (8.0 a.m. from Glasgow,

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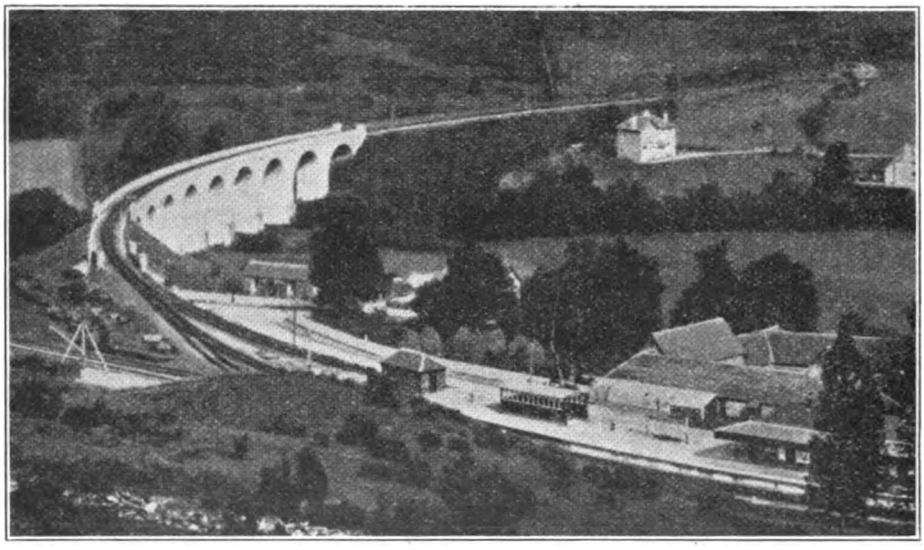
Buchanan Street), by which passengers can make the well-known "Trossachs Tour," from Callander by coach to the Trossachs Hotel, steamer on Loch Katrine to Stronachlacher, coach to Inversnaid and Loch Lomond steamer to Balloch and train back to Glasgow (or Edinburgh). The same trip can be made by the 9.45 a.m. from Glasgow and 9.25 a.m. from Edinburgh, which for Oban is notable in providing the outward journey of the now well-known and deservedly popular Pullman Observation Car. This is attached at the end of the train, its rear portion being rounded and glazed from roof to floor, so that passengers seated in the comfortable armchairs provided have practically uninterrupted views of the magnificent scenery of the route. Incidentally, lunch can be had *en route*. Although the car is restricted to first-class passengers, and is subject to a small supplementary charge, the adjoining vehicle is utilised for serving lunch to third-class passengers, so that they have the advantage of the restaurant facilities, if not of the car itself. The remaining down services: from Stirling, 1.4 (12.10 p.m. from Glasgow), 2.42, 5.31 (5.10 p.m. from Glasgow), with third-class Pullman Buffet Car (first-class passengers served in adjoining vehicle), and the night train at 12.15 a.m.

In the opposite direction the trains from Oban are the 6.20, 8.50, 11.5 (third-class Pullman Buffet Car to Glasgow) a.m., 12 noon, 3.45 (with First-Class Pullman Observation Car), 5 and 6.15 (with through carriages and sleeping car for London) p.m. Some of these trains omit certain intermediate stations, but the most unusual feature is the fact that the 11.5 a.m. from Oban is booked to call only at Balquhidder between Dalmally and Callander. During early spring and late autumn certain alterations are made, while the winter service is, of course, reduced; but during the summer the facilities provided are quite good and adapted to meet the needs of the considerable traffic then passing. Most of the Crieff trains connect with Oban trains in one or both directions at Balquhidder. The Crieff route is, moreover, associated with several of the special tours arranged by the L.M.S.R., as, for example, one from Edinburgh, Glasgow and other towns via Crieff and Aberfeldy (on the Highland section), Loch Tay, Killin and Callander, utilising rail, road and steamer. Also several other interesting and varied circular tours and day excursions.



LOCHEARNHEAD VIADUCT AND STATION.

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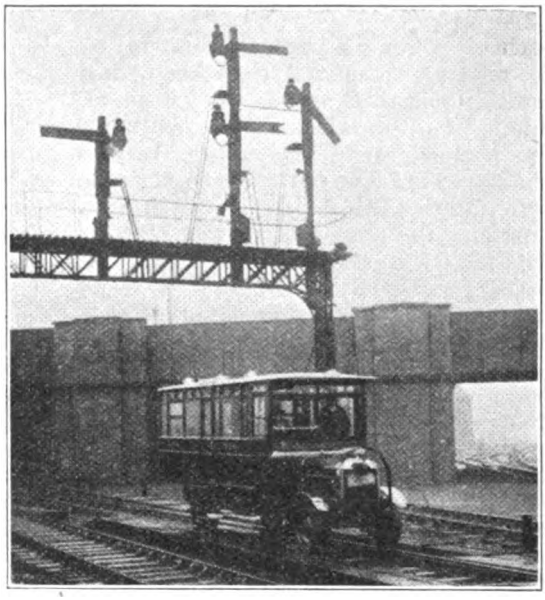
British Locomotive Practice and Performance.

By CECIL J. ALLEN,
M.Inst.T., A.I.Loco.E.



L.N.E.R. RAIL MOTOR-BUS PASSING SIGNALS AT CHURCH FENTON.

IN accordance with what has now become a standard New Year custom, Scottish railway matters claim exclusive attention in the present issue, and it falls to me, therefore, to detail something of current locomotive performance north of the Border. It so happens that, during the past year, I have seen a good deal of Scottish locomotive work at close quarters, and at a more than usually interesting time, with the Midland 4-4-0 compounds coming into general use on L.M.S. metals, and the Great Central "Directors" finding wide employment on those of the L.N.E.R. By the kindness of readers, also, a considerable number of logs of Scottish running have reached me during the past few months, making, together with my own material, a mass of data with which it would be quite impossible to deal in any way adequately in the confines of the present article. I must therefore confine myself to brief descriptions of the more noteworthy of the journeys, and one or two only over each route, in order to make the survey as wide as possible.

On the Caledonian main line, for some months after their introduction, Midland compounds appeared always to avoid the particular trains by which I was travelling, until at last I found one at the head of the 7.46 p.m. out of Carlisle. It was significant of the appreciation with which their tractive powers are regarded by the Scottish authorities that no pilot engine was provided, thus terminating a custom which had prevailed practically unbroken since the days and the exploits of the mighty *Cardean* on this train. To the credit of the Midland compound design be it said that No. 1140 not only did all that *Cardean* used to do, but very much more quietly, which bespoke a lower coal consumption, and, therefore, a higher efficiency figure. In view of the relative sizes of the two types, indeed, No. 1140 achieved quite a notable triumph in her running. The actual running times are compared in the first table with those made on a piloted trip on the same train a short while previously, when the pilot was carried through to Summit, and an exceptional time of under one hour was made for the start-to-stop journey of 49·7 miles to a point nearly 1,000 ft. in altitude above the starting-point.

To take the piloted run first, we attained a speed of 67 m.p.h. at Floriston, maintained a minimum of 52½ up 7½ miles at 1 in 200 from beyond Floriston, touched 64½ on the easy 3 miles past Kirtlebridge, and did not fall below 55 an hour on 4½ miles at 1 in 200 up to Brackenhill Summit. Then, on the faint descent to Nethercleugh (mostly 1 in 528), we

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reached 67 m.p.h. again, and up the 3½ miles at 1 in 202 from the Annan bridge to near Beattock we fell to 55½ m.p.h. Up the famous bank, continuing for 10 miles at grades mostly between 1 in 88 to 1 in 74, we fell finally to 32 m.p.h., before shutting off steam to stop at Summit, the time of 17 min. 20 sec. from Beattock to the Summit stop being excellent, even for two engines. A slightly less leisurely descent than usual followed to Carstairs, the 23·8 miles taking 25 min. 40 sec., start-to-stop, with maxima of 60 m.p.h. at Elvanfoot, 69 at Lamington and 66 at Thankerton, and a minimum of 52½ at Symington. Incidentally, by omitting the Beattock stop, we halted at Summit in 7¼ min. less than the scheduled passing time to that point; re-starting 4¾ min. ahead, we reached Carstairs in 4 min. less than the time allowed from Carlisle.

The Midland compound, with a train 20 tons heavier, and taking assistance only from Beattock to Summit, actually came within 50 sec. of the time last mentioned, but the standing time at Beattock was 1¼ min. less than the double-headed train had spent in detaching the pilot at Summit. No. 1140 started slowly, losing 40 sec. on the piloted train to Rockcliffe, and another minute

Table I.

L.M.S. (Caledonian Section), 7.46 p.m. Carlisle—Carstairs.

Distance.	Pilot Engine No. / Train Engine No. / Load (axles) / ,, (tons, tare) / ,, (tons, full)	Schedule.	*14455 / †96 / 44 / 307 / 325	None / ‡1140 / 48 / 330 / 345
Miles		min.	m. s.	m. s
0·0	Carlisle	0	0 00	0 00
4·1	Rockcliffe ..	—	6 05	6 45
8·6	Gretna	11	10 30	11 15
13·0	Kirkpatrick ..	—	15 30	16 25
16·7	Kirtlebridge ..	21	19 30	20 55
20·1	Ecclefechan ..	—	22 55	24 35
25·8	Lockerbie ..	30	28 50	30 35
28·7	Nethercleugh ..	—	31 40	33 15
31·7	Dinwoodie ..	—	34 35	36 05
34·5	Wamphray ..	—	37 15	38 45
		45	pass.	45 05
39·7	Beattock	47	42 25	46 §25
45·2	Greskine Box ..	—	51 15	57 55
		pass.	59 †45	pass.
49·7	Summit	67	62 20	
52·6	Elvanfoot ..	—	67 00	69 10
57·8	Abington.. ..	—	72 15	73 45
63·2	Lamington ..	—	77 00	78 35
66·9	Symington ..	84	80 50	82 10
70·0	Leggatfoot Box ..	—	83 55	85 00
73·5	Carstairs	92	88 00	88 50

* McIntosh superheated 4-4-0 (to Summit only).
† Pickersgill superheated 4-4-0.
‡ Midland compound 4-4-0.
§ 0-4-4 tank engine in rear, Beattock-Summit.

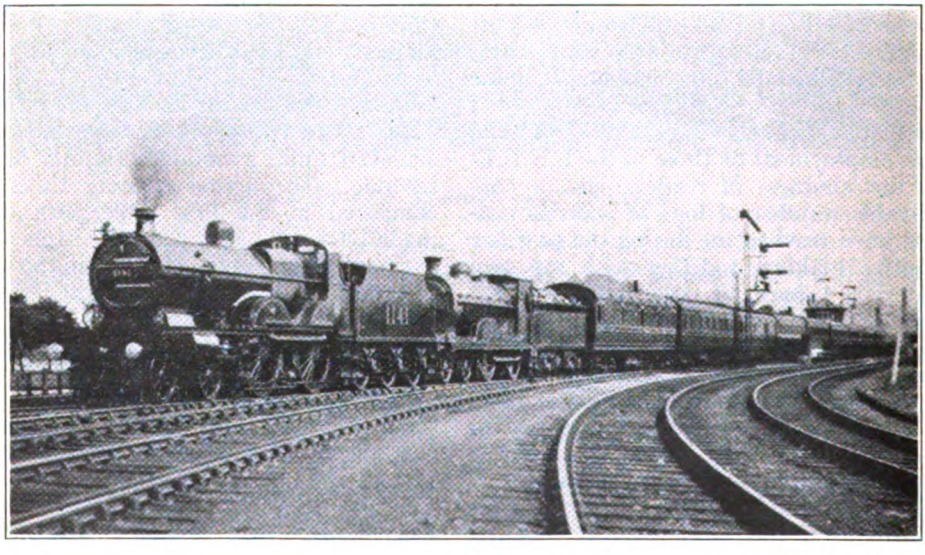

Photo.] [*Henry L. Salmon.*

DOWN WEST COAST EXPRESS PASSING PORT CARLISLE JUNCTION.

Midland type 4-4-0 compound No. 1141 and Caledonian 4-4-0 No. 14359.

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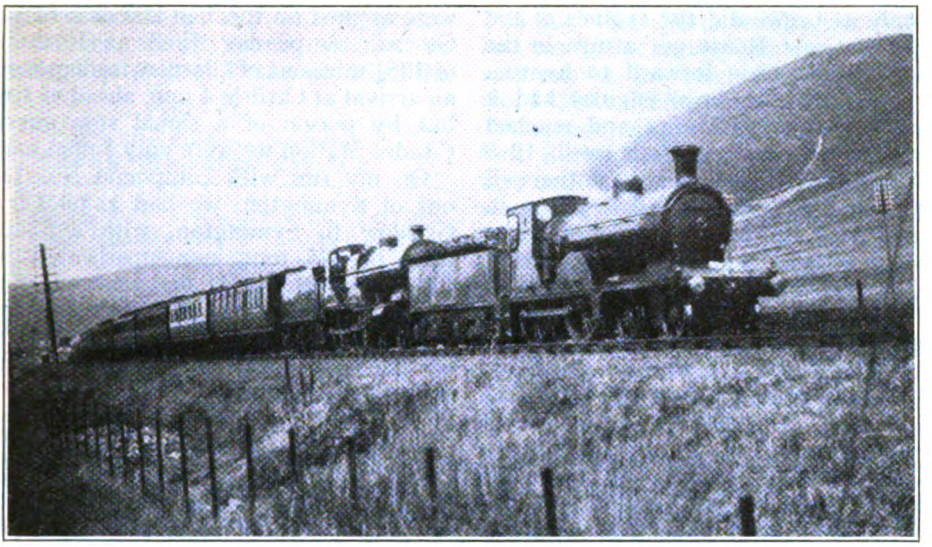

Photo.] **GLASGOW-LONDON EXPRESS NEAR BEATTOCK.** [*C. J. L. Romanes.*
Caledonian 4-4-0 No. 14328 and Midland type compound 4-4-0 No. 1135.

to Lockerbie, but from there she began to gain. Speeds were 65 m.p.h. at Floriston, 45 above Kirkpatrick, 60 at Kirtlebridge, 49 at Brackenhill, and 68 at Nethercleugh; time was just kept to Beattock, but 45 min. 5 sec. for this 39·7 miles is no mean feat, with such a load as 345 tons, and nearly 16 miles of the distance adverse to the engine at about 1 in 200. On Beattock bank speed was maintained at 34 m.p.h. for 3 miles, but fell back to between 32 and 33 on the 1 in 74. Summit was passed with a minute in hand, and thereafter some really brisk running, with maxima of 71½ m.p.h. at Elvanfoot, 72½ at Crawford, 69 at Lamington, 71½ at Thankerton and 72½ before Strawfrank, also minima of 69 beyond Elvanfoot, 66 beyond Abington, 55½ at Symington, and 65 at Leggatfoot, produced a gain of 3¼ min. to Carstairs. There is seldom any great interest in the remainder of the journey to Glasgow, owing to the constant speed restrictions; actually the 28·8 miles from Carstairs took 37 min. 40 sec., instead of 40 min. booked.

In the reverse direction I have tabulated a couple of runs on the corresponding train from Symington to Carlisle, the first with compound No. 1136, and the second with Pickersgill 4-4-0 superheater No. 14507 and a slightly lighter load. The latter did uncommonly well to Summit, with a top speed of 61 an hour at Lamington; a sustained rate of 52½–51½ up the next 6½ miles, mostly round about 1 in 300; a minimum of 47½ on the 2¾ miles at 1 in 240–152–142 past Crawford and a recovery to 53 on the Elvanfoot level (1¼ miles); while the final minimum on 2¼ miles at 1 in 99 to Summit was 39½ m.p.h. No. 1136's corresponding figures—60 at Lamington, 45 above Crawford, 57 at Elvanfoot, and 35½ at Summit—were not quite so good, the compound thus taking ½ min. longer to pass Summit than the simple. The compound was also slightly more restained in descending to Beattock, but after that had all the best of it, with speeds of 65 at Wamphray, 68 at Nethercleugh, 53 at Brackenhill, 66 at Kirtlebridge, and 69 past Gretna. The corresponding figures of No. 14507 were 66, 62½, 47, 67 and, at Gretna, 72½ m.p.h., but after that the engine was eased. However, in this case 2¾ min. were gained to Carlisle; the compound gained 4½ min.

During the last summer I had one singular run on the 10 a.m. from Glasgow to Carlisle by the Caledonian route, in that the engines were a Midland compound piloting a Glasgow and South Western 4-6-0! To complete the singularity, we were taken forward from Carlisle to Crewe by a Lancashire and Yorkshire 4-6-0,

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and only at Crewe did the engines of the late West Coast Route get a turn in the haulage of the train forward to Euston. Out of Glasgow the two engines had a 12-coach train of 365 tons, and reached the conditional stop at Motherwell, 12·8 miles, in 19 min. 25 sec. From Motherwell we passed Law Junction, 5·4 miles, in 11 min. —an unbroken ascent steepening from 1 in 137 to 1 in 99, on which we fell to 33½ m.p.h.—and Craigenhill Summit, 10·8 miles, in 19 min. 55 sec., speed being maintained at 37 m.p.h. on the 1 in 130 past Braidwood. Carstairs, 16 miles, was passed in 25 min. 35 sec., at 45 m.p.h., and Symington, 22·6 miles, in 34¼ min., or 54 min. 50 sec. from Glasgow, leaving over 79 min. for the remainder of the journey to Carlisle. With speeds of 64 an hour at Lamington and a minimum of 48 before Crawford, and despite a p.w.r. caution to 30 m.p.h. at Elvanfoot, Summit was passed in 21 min. 40 sec. from Symington; then, with the easiest of running, the times were 10 min. 55 sec. from Summit to Beattock, 14 min. 10 sec. thence to Lockerbie, 10 min. 25 sec. on to Kirtlebridge, and 8 min. 25 sec. thence to Gretna. No higher speeds were reached anywhere than 65 m.p.h., and brakes were applied on the 1 in 200 descent past Gretna. A passing time at Rockcliffe of 125¼ min. out of Glasgow made possible an arrival at Carlisle 4 min. ahead of time, but by reason of a signal stop outside Citadal Station we were only ½ min. early.

On my run with compound No. 1136 out of Symington, we had as pilot from Glasgow to Symington, with a 53-axle train of 375 tons, non-superheated McIntosh 4-4-0 No. 14351, and made one of the fastest climbs to Craigenhill I have yet recorded—so much so, indeed, that we preceded the Edinburgh portion from Strawfrank, instead of following it as scheduled. Speeds were 52½ m.p.h. at Rutherglen, 61½ at Uddingston, where the climb begins, 44 at Motherwell, 42½ at Flemington, 36 at Wishaw, 33 at Law Junction, 37½ at Carluke and 43 at Craigenhill. From Uddingston to Craigenhill the line rises approximately 650 ft. in 15·1 miles (at 43 ft. per mile, or roughly 1 in 125), and this distance we covered in 23 min. 5 sec., at an average speed throughout of 39·2 m.p.h. Times out of Glasgow were 5¾ min. to Rutherglen, 11¾ min. to Uddingston, 17 min. to Motherwell, 25 min. 40 sec. to Law Junction, 34 min. 50 sec. to Craigenhill, 40 min. 55 sec. (despite

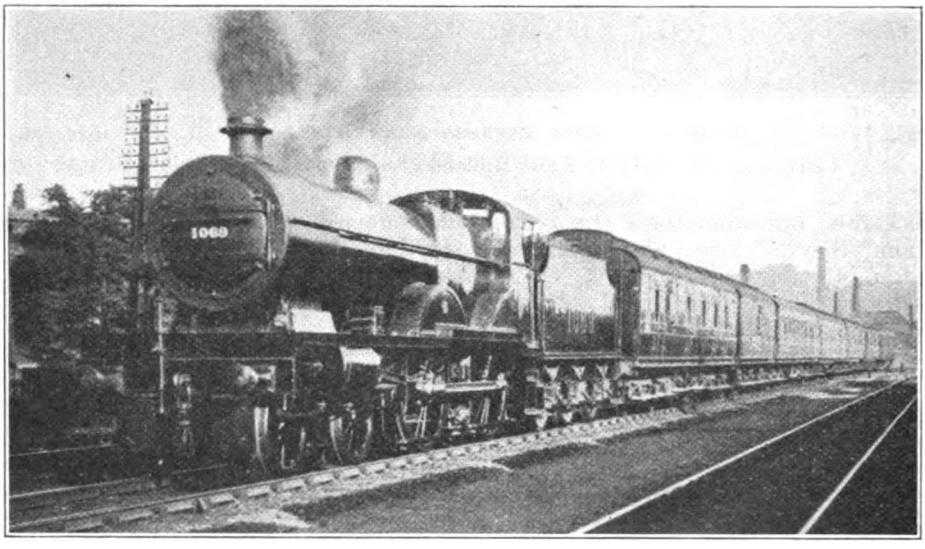

Photo.] [*Henry L. Salmon.*

ST. PANCRAS-GLASGOW (ST. ENOCH) EXPRESS LEAVING CARLISLE.

Midland type 4-4-0 compound locomotive No. 1069.

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a signal check to 30 m.p.h.) to Carstairs, and 49 min. 35 sec. to Symington, or 49 min. net, a gain of 4 min. on schedule.

TABLE II.

L.M.S. (CALEDONIAN SECTION), 2.29 P.M. SYMINGTON—CARLISLE.

Distance.	Engine No. ..	Schedule.	*1136	†14507
	Load (axles) ..		47	44
	,, (tons, tare)		315	304
	,, (tons, full)		330	320
Miles		Min.	m. s.	m. s.
0·0	Symington ..	0	0 00	0 00
3·7	Lamington ..	—	6 20	5 55
9·1	Abington ..	—	12 10	11 50
11·6	Crawford ..	—	15 10	15 50
14·3	Elvanfoot ..	—	18 30	18 10
17·2	Summit	23	22 35	22 05
21·7	Greskine Box ..	—	27 10	26 40
27·2	Beattock	34	32 50	32 10
32·4	Wamphray ..	—	37 40	37 20
35·2	Dinwoodie ..	—	40 20	30 10
38·2	Nethercleugh ..	—	42 55	43 05
41·1	Lockerbie ..	48	45 40	46 00
46·8	Ecclefechan ..	—	51 40	52 35
50·2	Kirtlebridge ..	57	54 55	55 45
53·9	Kirkpatrick ..	—	58 30	59 30
58·3	Gretna	65	62 30	63 25
60·8	Floriston	—	64 40	65 35
64·9	Kingmoor Box ..	—	68 35	70 05
66·9	Carlisle	76	71 35	73 15

* Midland 4-4-0 compound.
† Pickersgill 4-4-0 superheater.

My other southbound trip from Symington was preceded by a run on the 1.30 p.m. from Edinburgh, behind Pickersgill superheated 4-4-0 No. 14478, with a 28-axle load of 215 tons. It had no special features; Kingsknowe, 3 miles, was passed in 6 min. exactly; Ravelrig Junction, 7·4 miles, in 12 min. 20 sec.; Midcalder, 10·1 miles, in 16½ min.; Harburn, 15·3 miles, in 24½ min., and Cobbinshaw (summit) in 29 min. 50 sec., speed having ranged from a minimum of 39 m.p.h. on the 1 in 102-143-134 beyond Merchiston to 43½ on the 220 at Midcalder Junction, after which we fell to a steady 37 on the 8 miles at 1 in 100 which forms the culmination of this 16 miles' ascent. With a maximum rate of 68 an hour at Auchengray, and the usual severe slack through the tortuous purlieus of Carstairs, we passed Strawfrank Junction, 27·4 miles, in 39 min. 5 sec., and reached Symington, 33·7 miles, in 47½ min., ½ min. late.

On the northern section of the Caledonian I have had but one run, on the 7.47 p.m. from Perth to Glasgow, but this had particular interest in that the engine was one of the large 3-cylinder 4-6-0's, No. 14800. Unfortunately the train, consisting as it did of eight 12-wheelers and four 8-wheelers, and weighing 414 tons tare and 440 tons full, was so heavy that we had to take 4-4-0 No. 14343 as pilot over Gleneagles summit to Stirling. On the first undulating and level 5 miles out of Perth we got up to 52 m.p.h. beyond Forgandenny; the next 5¼ miles up, averaging between 1 in 400 and 500, did not bring us below 49 an hour; and finally, on the upper 7 miles of the bank, entirely at 1 in 121-100 (save for occasional steeper pitches at 1 in 90), we did not fall below 34½ m.p.h. Thus we passed Forgandenny, 3·9 miles, in 6 min. 35 sec.; Forteviot, 6·8 miles, in 10 min.; Dunning, 9·6 miles, in 13 min. 20 sec.; Auchterarder, 13·7 miles, in 19 min. 50 sec.; and reached Gleneagles, 15·8 miles, in 23½ min., as against 26 min. booked. From Gleneagles, although the train

TABLE III.

L.M.S. (G. & S.W. SECTION), 5.10 P.M. GLASGOW—AYR.

Distance.	Engine, 4-6-0 No.	Schedule.	503	503
	Load (axles) ..		40	40
	,, (tons, tare)		289	280
	,, (tons, full)		310	300
Miles		min.	m. s.	m. s.
0·0	St. Enoch ..	0	0 00	0 00
1·6	Shields Road ..	3	4 30	4 40
4·2	Cardonald ..	—	8 00	8 10
7·7	Paisley*	10	12 20	12 30
9·7	Elderslie	—	14 55	15 15
12·3	Millikenpark ..	—	17 55	18 15
16·5	Lochside	—	23 05	23 05
18·6	Beith	24	25 15	25 10
20·6	Glengarnock ..	—	27 20	27 10
23·3	Dalry	29	30 00	29 47
26·8	Kilwinning ..	33	33 15	33 00
			p.w.s.	p.w.s.
30·2	Irvine	37	37 25	36 25
33·8	Barassie	—	41 40	40 10
34·9	Troon (Goods) ..	42	42 50	41 20
38·3	Prestwick ..	—	46 40	44 47
				sigs.
41·4	Ayr	50	50 40	49 05
41·4	Net times ..	50	48¾	47¾

* Service slack.

starts on an up-grade of 1 in 200, there is still ½ mile at 100 to tackle before the summit is breasted; we passed Blackford,

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2·2 miles, in 4¾ min., and Kinbuck, 9·6 miles, in 12 min. 55 sec., but then went so slowly down Dunblane bank that the start-to-stop time from Gleneagles to Stirling, 17·2 miles, allowed 22 min., was actually 22¼ min.

Here No. 14343 and two coaches came off, leaving No. 14800 to handle a 56-axle train of 385 tons unassisted to Glasgow via Coatbridge. On the 2 miles up at 1 in 118 to Plean we fell from 41½ to 33 m.p.h., passing that station, 4·1 miles, in 7 min. 55 sec., touching 61½ m.p.h. at Alloa Junction, and falling to 46 m.p.h. up 1½ miles at 1 in 164 to Larbert, which was passed in 12 min. 40 sec. (8·8 miles). Two miles at 1 in 103 to Greenhill (12·4 miles, 18¼ min.) were climbed at a minimum of 32 m.p.h., steadily maintained, and after a maximum of 49½ m.p.h. on the easy 1½ miles before Castlecary, we went up ¾ mile at 1 in 98 and 2 miles at 1 in 128 to Cumbernauld (17·8 miles, 26 min. exactly) at a lowest rate of 35½ m.p.h. Despite this satisfactory climbing, however, our gross time of 34 min. 40 sec. from Stirling to the conditional Coatbridge stop, 23·5 miles, was 1¾ min. over schedule; but notwithstanding running at the most cautious speed over the serpentine stretch from Coatbridge into the Central Station in 18¾ min., we economised 2¼ min. on this final booking, and arrived dead on time at 9.35 p.m.

On the neighbouring Glasgow and South Western section I had a most unexpected experience with one of the non-superheated 4-6-0 engines on the 5.10 p.m. 50-minute express from Glasgow to Ayr. I was very tempted to abandon the trip when I saw a 4-6-0 at the head of the train at St. Enoch, instead of a 4-6-4 tank, as I had hoped, and very likely should have done, but for an intention to proceed through to Stranraer. This was fortunate, in view of the running detailed in the first column of Table 3; the run was made, of course, during the summer, when the train is entirely corridor stock, and includes the Turnberry portion with Pullman restaurant car. From the start speed rose to a maximum of 50½ m.p.h. through Elderslie, and then fell to 49 at Millikenpark, recovering to 50½ before the summit of the rise was passed. At Lochside we had attained 55½ m.p.h., at Beith 59, and, after a minimum of 57 at Glengarnock, 65 at Dalry and 66 at Kilwinning, which was passed dead on time. Then, unfortunately, there came a pitfall slack

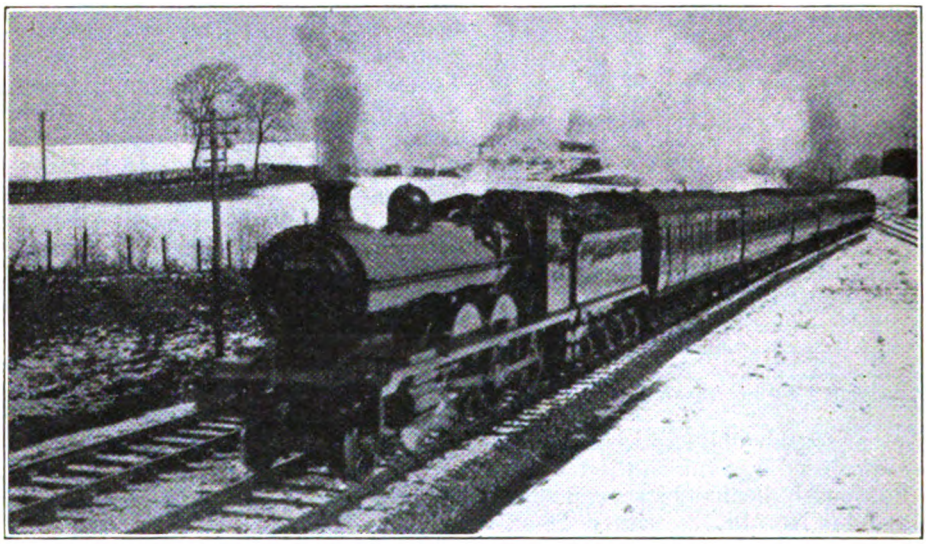

Photo.] [*J. W. Kerr.*

GLASGOW (ST. ENOCH)-ST. PANCRAS EXPRESS NEAR POLLOKSHAWS.

G. & S.W. type 4-6-0 locomotive No. 14668.

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at Bogside, likely for some time to be permanent, after which we did not recover to any higher speed than 57½ m.p.h. at Monkton; for all that, the loss on schedule to Ayr was only 40 sec., and the net time was not more than 48¾ min.

A Dalmellington correspondent, whose beautifully-compiled logs are always a pleasure to study, sends me details of an even finer journey with the same engine, train and load—but for a negligible difference of 10 tons—in which the quite electrifying rate, for this particular journey, of 73 m.p.h. was attained at Kilwinning before the slack. His trip is detailed in the second column of the same table. In this case a slack to 40 m.p.h. was made through Paisley, and the engine gradually accelerated to 48 at Elderslie, 52 past Howwood and Lochside, speeds just a shade higher than mine from Beith to Dalry, and the 73 m.p.h. already mentioned just beyond Kilwinning. The observance of Bogside slack was considerably less severe than on my journey, and thereafter 60 m.p.h. was touched at Barassie and at Monkton, Ayr being reached a minute early, despite a slight preliminary signal check. Net time was 47¾ min. Robert Duncan, of Ayr shed, was the driver, and it seems probable, from a comparison of the figures, that he was the presiding genius on my run also.

The same correspondent, to whose experiences on the mountainous Ayr and Stranraer route I devoted a good deal of space in January of last year, sends details of some further journeys, in which the haulage of some comparatively heavy loads has resulted from the working of restaurant cars to and from Stranraer last summer; but with these and my own timings over this course considerations of space do not permit me to deal at present, nor with some further smart running over the G. & S.W. section between Glasgow and Greenock. Two other runs between Paisley and Ayr, however, require mention, in order that the doings of the 4-6-4 tanks and the large-boilered four-cylinder 4-4-0, *Lord Glenarthur*, may not entirely escape notice. No. 540, the pioneer 4-6-4, with a 36-axle train of 265 tons, on the 12.30 p.m. luncheon car service, after reaching Paisley in 11 min. exactly, and despite being slacked to 25 m.p.h. to take the slow road through Elderslie, passed Millikenpark in 8 min. 10 sec., Lochside in 13 min. 20 sec., Beith in 15½ min., Dalry in 20 min. 35 sec., and Kilwinning in 24 min.; slacking severely over the Bogside subsidence, her subsequent times

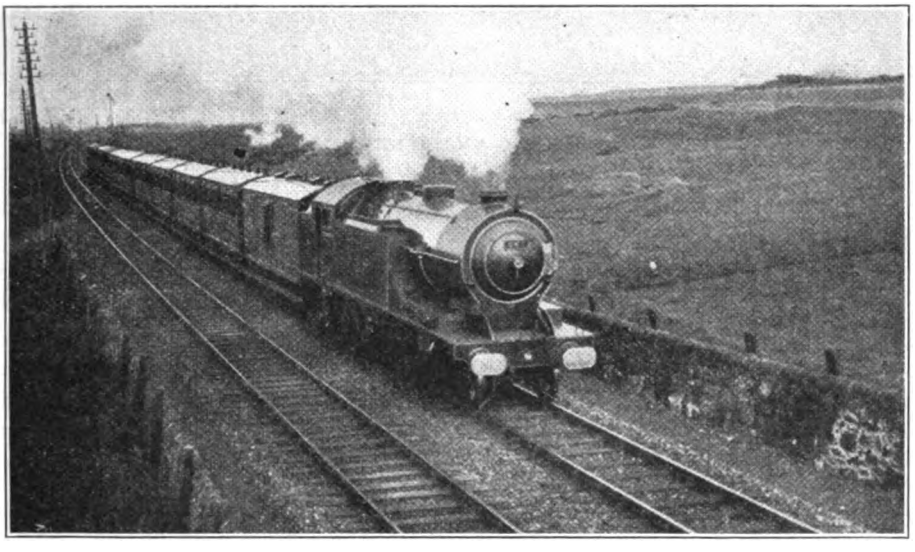

Photo.] **GLASGOW-AYR TRAIN NEAR TROON.** [*C. J. L. Romanes.*

G. & S.W. type 4-6-4 tank engine No. 541.

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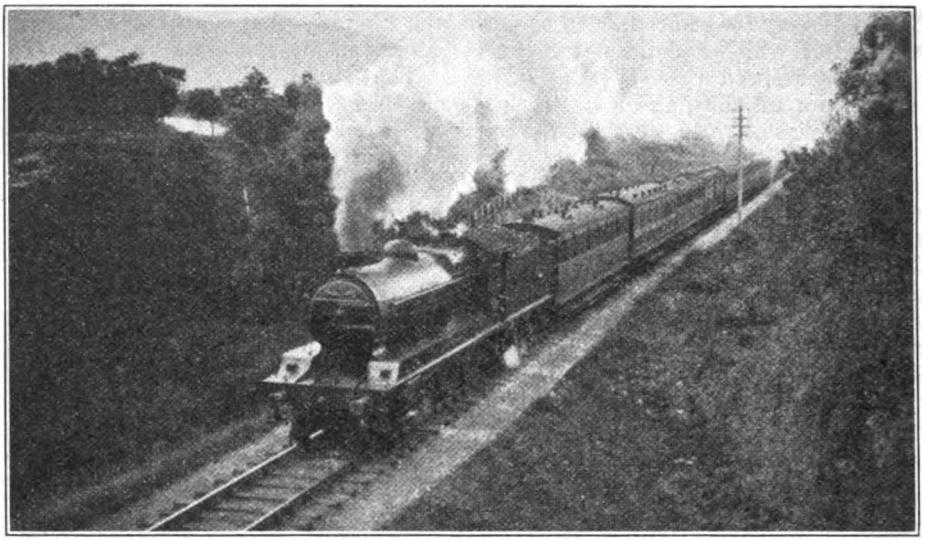

Photo.] [*C. J. L. Romanes.*

INVERNESS-GLASGOW TRAIN NEAR NEWTONMORE.

Highland type 4-6-0 locomotive No. 55, "Clan Mackinnon."

were 28½ min. to Irvine, 32½ min. to Barassie, 36 min. 25 sec. to Monkton, and 41 min. 25 sec., or 39 min. net, to Ayr, against 41 min. allowed. The 60-m.p.h. rate was not exceeded at any point.

In the reverse direction, as noted by another correspondent, No. 14509, *Lord Glenarthur*, with a 46-axle train of 325 tons, from Ayr passed Prestwick in 6 min. 10 sec., Troon (Goods) in 10 min. 25 sec., Irvine in 15 min. 40 sec., Kilwinning (after a severe slack at Bogside) in 20¾ min., Dalry in 25 min. 5 sec., Beith in 31 min. 35 sec., Lochside in 33 min. 47 sec., Millikenpark in 38 min. 6 sec., and Elderslie in 40 min. 37 sec., reaching Paisley in 43 min. 11 sec., or 40½ min. net, a praiseworthy gain of 5½ min. net on schedule time. Maximum speeds were 55½ m.p.h. at Irvine, and 63½ at Elderslie, and on the adverse grades from Kilwinning speed gradually recovered to 47½ an hour at Dalry and 54 from Beith to Lochside—an excellent performance with this load. On the main Carlisle line the time economised by drivers out of the excessive allowances for the Mossgiel Tunnel rebuilding and the pitfall slacks near Auchinleck, and added by them to already easy schedules, still make the average performance too leisurely to merit attention, and I now pass on, therefore, to the Highland section.

In this connection a correspondent reminds me, to my shame, that seven years have elapsed since last the Highland received mention in these columns. I might remind him, *per contra*, that the Highlands of Scotland are not exactly convenient of access to the Londoner desirous of, say, occupying a vacant afternoon in the acquisition of useful running data! This summer I have, however, enjoyed a brief reacquaintance with the Highland main line, and with the help of some logs forwarded by correspondents, it is possible for me to give some notes on current Highland running. On the whole it appears to me to be considerably less energetic than it once was, after making all allowances for the formidable grades and the increase in loads entailed by the widespread use of restaurant cars and the almost exclusive employment of corridor stock in the formation of the principal trains.

For example, one of the latest type 4-6-0 engines, No. 14767, *Clan Mackinnon*, with a not immoderate load of 330 tons (ten corridor 8-wheelers and one 12-wheeler), lost 3 min. 10 sec. on the non-stop booking of 124 min. for the 71·6 miles from Perth to Kingussie, despite the assistance in rear of a 4-4-0 "Ben" from Blair Atholl to Dalnaspidal. On the un-

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assisted length speed fell to 30 m.p.h. up the 1 in 125 to Stanley Junction, and 25½ up 2 miles at 1 in 82 to Kingswood Crossing, while not rising above 51½ on the level stretch between Dunkeld and Ballinluig. Minimum on 3 miles up, mostly at 1 in 85-90, past Pitlochry, was 25½ m.p.h.. and then, after stopping 3½ min. at Blair Atholl to attach the "banker," the joint effort of the two engines was not enough to maintain more than from 22 to 24 m.p.h. up the 11 miles at 1 in 70 from Struan to Dalnaspidal. After the banker had dropped off here, *Clan Mackinnon*, on the last mile at 1 in 78 to Drumochter Summit, fell to 17½ m.p.h. Subsequently speed was not allowed to exceed 55½ m.p.h. in the descent to Kingussie. Passing times were: Stanley Junction, 7·2 miles, 14 min. 35 sec.; Dunkeld, 15·6 miles, 29 min. 10 sec.; Ballinluig, 23·6 miles, 39 min. 50 sec.; Pitlochry, 28·5 miles, 47½ min. (5½ min. late); and Blair Atholl, arrive, 35·3 miles, 59½ min. From the fresh start Dalnaspidal, 15·7 miles, was passed in 36 min. 5 sec., and Drumochter, 17·7 miles, in 40½ min., Kingussie, 36·4 miles, being reached in 64 min. 10 sec.

In the reverse direction 4-6-0 No. 145, *Murthly Castle*, had an almost identical eleven-coach load of 325 tons, but was piloted throughout, save only during the descent of the bank from Dalnaspidal to Blair Atholl. From Aviemore the assistance was provided by one of the early "Loch" class engines—No. 14396, *Loch Ruthven*, the initial run of 11·7 miles to Kingussie, undulating, but mostly against the engines, occupying 16 min. 20 sec., start-to-stop, against 18 min. booked. From Kingusie, Newtonmore, 2·9 miles,, was passed in 5 min. 25 sec., Dalwhinnie, 13 miles, in 24 min. 25 sec., and Drumochter, 18·6 miles, in 37 min. 5 sec., Dalnaspidal, 21·6 miles, being reached in 39¾ min. From Newtonmore to Dalwhinnie the ascent is mostly at between 1 in 100 and 150, and from there to Drumochter at 1 in 80. A more rapid run than usual was made down to Blair Atholl, the 15·7 miles taking 17 min. 55 sec., start-to-stop, with speeds mainly between 60 and 62½ m.p.h., and an early arrival of 3 min. The pilot from here was a 4-4-0 "Ben," but poor work followed, the time taken to a special stop at Pitlochry being 12 min. 50 sec., and from there 19 min. to Dunkeld, 31 min. 35 sec. to Stanley, and 41½ min. to Perth. Speed nowhere exceeded 56½ m.p.h., and such a time as 10 min. 55 sec. down the tempting descent from Stanley to Perth, 7·2 miles, seems inexcusable, with the train running late.

Better work was done on the two short

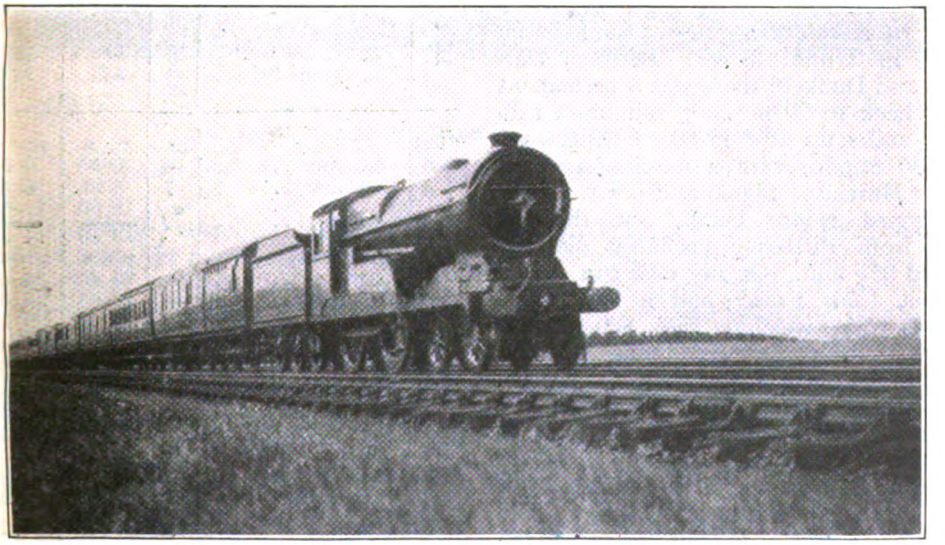

Photo.] **GLASGOW-EDINBURGH EXPRESS NEAR HAYMARKET.** [*C. J. L. Romanes.*

G.C. type 4-4-0 locomotive No. 6385, "Luckie Mucklebucket."

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runs tabulated between Pitlochry and Perth. *Darnaway Castle*, with but a modest load, it is true, had already

TABLE IV.

L.M.S. (HIGHLAND SECTION)
PITLOCHRY–PERTH.

Distance.	Engine 4-6-0 No.	58	14763
	,, Name ..	*Darnaway Castle.*	*Clan Fraser.*
	Load (axles) ..	31	54
	,, (tons tare) ..	195	337
	,, (tons full) ..	205	360
Miles.		m. s.	m. s.
0·0	Pitlochry	0 00	0 00
4·9	Ballinluig	6 20	7 05
8·2	Dalguise	10 02	11 20
		p.w.r.	
12·9	Dunkeld	16 27	18 05
15·6	Kingswood ..	20 53	23 40
18·1	Murthly	23 53	27 05
21·2	Stanley Jc.* ..	27 51	32 05
		sigs.	
23·3	Strathord	31 40	35 20
			sigs.
24·3	Luncarty	33 20	36 30
		p.w.r.	
28·5	Perth	40 06	43 45
28·5	Net times (min.) ..	35½	41½

* Severe service slack.

gained 1¾ min. by running from Blair Atholl to Pitlochry in 10 min. 16 sec., and then made a smart exit from the latter station, covering the first 2·7 miles to Moulinearn, mostly at 1 in 90 down, in 3 min. 48 sec. Between Dalguise and Dunkeld there was a permanent way check to 20 m.p.h.; minimum rate on 2¼ miles up at 1 in 80 to Kingswood was 30 m.p.h., with a maximum of 62 before Murthly. Signal and p.w.r. checks intervened before Perth, but the net time from Pitlochry probably did not exceed 35½ min. On my own run which follows, *Clan Fraser* had a substantial 54-axle train, weighing fully 360 tons all found. We passed Ballinluig at 52½ m.p.h., maintained from 46 to 48½ an hour until the short 1 in 100 rise before Dunkeld, which brought us down to 32, and then touched 42½ at Dunkeld before falling to 21 at Kingswood Summit. We then touched 53 an hour, but slacked to 45 through Murthly; fell to 30 up the subsequent 1½ miles at 1 in 108, and reached 49 before slacking to 25 through Stanley. Between there and Perth we had signal and p.w. checks; net time from Pitlochry to Perth was about 41½ or 42 min.—not a very inspiring, but for all that a timekeeping performance. It should be added that very little reduction of speed, and more often than not none at all, is made for the crossing stations on the single sections of the Highland main line which are well laid out for high speed running, and equipped for automatic exchanging of tablets; so that single line working cannot be added to the gradients as a serious hindrance to the maintenance of speed over the Highland line.

From these northerly regions we may turn to the Southern Scottish area of the L.N.E.R., more familiar, doubtless, under its pre-grouping style of North British Railway. By way of violent contrast with the Highland main line, just considered, we may take first the Glasgow–Edinburgh section. This certainly has one gradient even steeper than any to be found even on the Highland main line—the 1 in 45 from Glasgow for 1¼ miles out to Cowlairs—but thereafter the route is one of the most,

TABLE V.

L.N.E.R. (N.B. SECTION)
8.40 A.M. GLASGOW–EDINBURGH.

Distance.	Engine No. 6379, *Baron of Bradwardine.*			
	Load (axles) ..	Schedule.	44	44
	,, (tons tare) ..		336	326
	,, (tons full) ..		355	345
Miles		m.	m. s.	m. s.
0·0	Glasgow	0	0 00	0 00
1·5	Cowlairs	7	5 35	6 10
6·2	Lenzie	*	13 00 / 13 40	13 50 / 14 30
			p.w.s.	p.w.s.
11·4	Croy	—	23 40	24 15
15·5	Castlecary	—	28 05	28 40
21·8	Falkirk	—	34 05	35 10
			p.w.s.	p.w.s.
25·0	Polmont	†36	39 20	40 45
4·7	Linlithgow ..	—	7 20	7 10
7·8	Philpstoun ..	—	10 40	10 25
9·7	Winchburgh Jc. ..	13	12 45	12 25
14·1	Ratho	18	16 55	16 25
18·8	Saughton	—	21 30	20 35
21·1	Haymarket ..	‡26	24 15	23 20

* Conditional stop: 13 min. allowed if passing
† 34 min. if Lenzie stop is not made.
‡ 27 min. if Lenzie stop is not made.

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if not for its length the most, singularly level lines in Scotland, and the more so in that it crosses the country from one side to the other. I give first, in tabular form, two runs on the 8.40 a.m. out of Glasgow, which, with its 11-coach train, in my judgment continues—at least, when the Lenzie conditional stop is made—to be the hardest turn on this service. I might possibly except the 4 p.m., which since its expedition to a 62-minute run is with a corresponding load none too easy. Furthermore, a new and severe pitfall slack near Croy, added to what is apparently a permanent slack for the same reason through Falkirk Tunnel, adds yet more to the difficulty of timekeeping.

The engine on both my runs was of the Great Central "Director" 4-4-0 type, No. 6379, *Baron of Bradwardine*, and on both occasions Lenzie stop was called. Much the better running between Lenzie and Polmont occurred on the first run, when speed rose to as much as 66 m.p.h. between Bonnybridge and Falkirk, though then reduced to 30 for the tunnel; even so, with stop and both pitfall checks, we were 3¼ min. late at Polmont. By halving the booked stop there, however, and making a smart run onwards, with a top speed of 65 m.p.h. at Gogar, we were but ½ min. late into Haymarket. On the second trip the *Baron* was unaccountably sluggish from Lenzie to Polmont, not exceeding a maximum of 60 m.p.h., and stopped 4¾ min. late. But a brilliant run was made on to Haymarket—21·1 miles in 23 min. 20 sec., start-to-stop—speed rising to 65 an hour at Winchburgh, 69 at Ratho, and no less than 70½, practically on a level track—the actual inclination is 1 in 960 for 12 miles—with a 345-ton train, from Gogar to Saughton. By a short stop at Polmont, again, we were only 1¼ min. late into Haymarket. On a third occasion, not tabulated, No. 6378 had a train of exactly the same weight, made no stop at Lenzie, and accelerated so poorly from the Croy slack, with a maximum of only 55½ m.p.h., as to take 36 min. 10 sec. from Glasgow to Polmont. But by running from Polmont to Haymarket in 24 min. 55 sec., with a top speed of 64 an hour at Gogar, we reached Haymarket ¾ min. early. It is the Lenzie stop, with an increased conditional allowance of only 2 min. to Polmont, one of which is subsequently deducted from the Polmont–Haymarket schedule (leaving a net con-

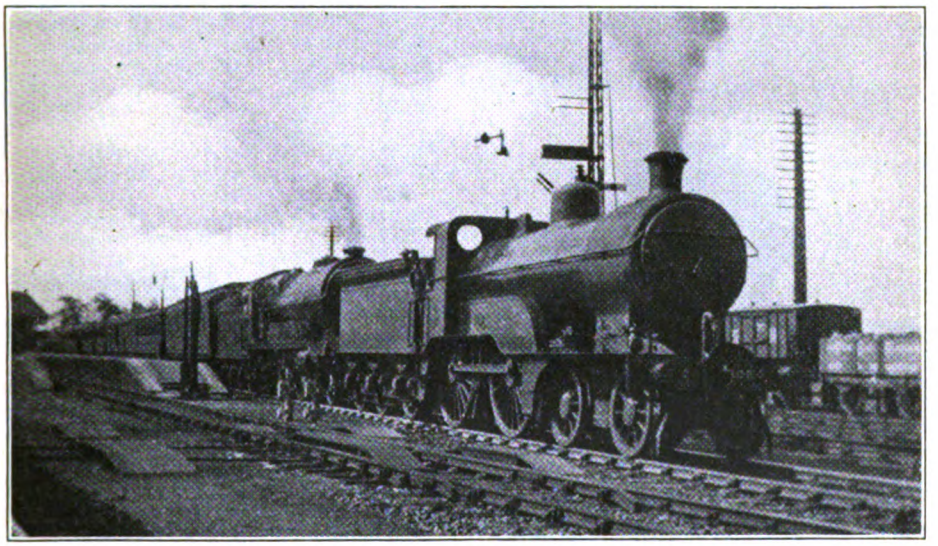

Photo.] [*H. S. C. Everard.*

AN EAST COAST EXPRESS AT LEUCHARS JUNCTION.

G.N. type 4-4-0 No. 3064 and N.B. type 4-4-2 No. 9509, "Duke of Rothesay."

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cession of only 1 min. for making a stop from a speed ruling round about 52 or 53 m.p.h.), that causes the time-keeping difficulty on this train.

I must mention also the run of a reader behind a superheated "Glen" 4-4-0, which, despite the handicap of only 6-ft. wheels, displayed a surprising turn of speed, thereby confirming the good reputation which is always held by this particular type. No. 9408, *Glen Sloy*, was the engine; the train was a seven-coach non-corridor relief to the 4 p.m. out of Glasgow. Cowlairs was passed in the remarkable time of 4¾ min., Lenzie in 9 min. 50 sec., Croy in 15 min. (the p.w. check here was not at the time operative), Castlecary in 18¾ min., Falkirk in 24 min. 40 sec., Polmont in 28¾ min., and Linlithgow in 33¼ min.; after that, most unfortunately, signal checks supervened, but for which Haymarket would, without doubt, have been reached in 49 min., and Waverley, on a non-stop journey, might have been attained in 52 min. from Glasgow, or eight minutes under the present fastest non-stop schedule! From Croy to the Falkirk slack speed was maintained entirely between the limits of 62 and a maximum of 69 m.p.h. (near Castlecary); and after the tunnel slack, speed rose again to 68 at Manuel and was being sustained at 66 after Linlithgow, when the first signal check occurred. No steeper grade occurs at any of these points than 1 in 887. In due consideration of the engine employed, this is, perhaps, the most noteworthy, and certainly the most unexpected, of all the runs in the present article.

Having arrived at Edinburgh, my next duty is obviously to re-acquaint the reader with the locomotive work performed over the East Coast Route between there and Aberdeen. Whole articles would be necessary in which adequately to translate the lack of anything spectacular in the times into an appreciation of the peculiar merit of the work performed, which is second to none north of the Border, in due consideration of the extreme difficulties of grading and speed restriction, and is better than most. Going north, I have first tabulated two runs to Dundee on the moderately-loaded 2.15 p.m. out of Waverley. In Turnhouse "dip" we touched 62½ and 69 m.p.h., after which there followed the usual cautious passage of the Forth Bridge, and the tortuous section down to and through Inverkeithing. Up the 1 in 95 from there to Dalgetty, we *accelerated* from 30 m.p.h. to exactly 40 (a remarkable achievement) and 33½

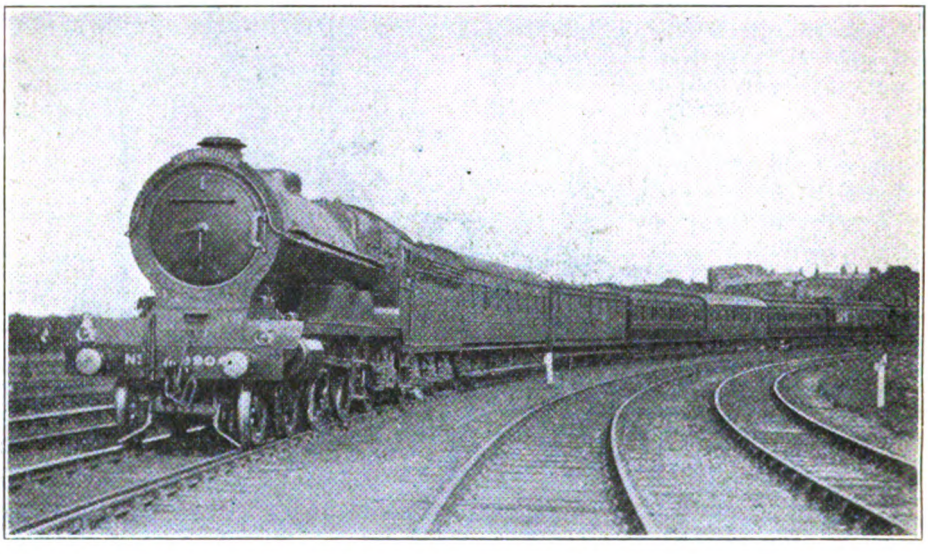

Photo.] **WAVERLEY ROUTE EXPRESS LEAVING CARLISLE.** [*H. Gordon Tidey.*

N.B. type 4-4-2 locomotive No. 9904.

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m.p.h. respectively, and again there followed cautious downhill running, until we slackened to 30 through Burntisland.

TABLE VI.

L.N.E.R. (N.B. SECTION). EDINBURGH-DUNDEE.

Distance.	Engine 4-4-2, No. / Engine name .. / Load (axles) .. / ,, (tons tare) .. / ,, (tons full) ..	Schedule.	9875 *Mid-lothian.* 26 190 200	9874 *Dune-din.* 30 219 230
miles		min.	m. s.	m. s.
0·0	Edinburgh (W.) ..	0	0 00	0 00
3·5	Saughton	—	6 30	6 45
6·5	Turnhouse ..	—	9 35	10 10
9·5	Dalmeny*	13	12 40	13 30
11·2	Forth Bridge N.*..	16	16 00	16 55
13·2	Inverkeithing* ..	19	18 35	19 10
16·0	Dalgetty Summit..	—	23 30	24 15
20·2	Burntisland* ..	29	28 20	29 00
22·8	Kinghorn	—	32 20	32 50
			p.w.s.	
25·9	Kirkcaldy	37	37 10	36 35
29·0	Mile-post 29 ..	—	41 25	40 35
			p.w.s.	p.w.s.
30·7	Thornton Jc.* ..	44	44 25	43 05
34·9	Lochmuir Summit	—	50 25	49 05
39·1	Ladybank Jc.* ..	55	54 45	53 35
42·3	Springfield ..	—	58 45	57 35
			p.w.s.	
44·6	Cupar	—	61 15	59 50
50·9	Leuchars Jc. ..	68	68 15	66 30
				sigs.
54·6	St. Fort	—	72 05	70 45
56·5	Tay Bridge South.*	74	74 15	73 15
59·2	Dundee	80	79 20	78 55
59·2	Net miles (min.) ..	80	76	77½

* Severe service slack.

Up the 1 in 305–128 thence to Kinghorn accelerations were made on both runs to 42 m.p.h.; *Midlothian* then had a very bad bridge renewal check at Invertiel Junction, whereas *Dunedin*, on this level and gradually rising length, attained 56½ m.p.h. From there to Sinclairtown the rise gradually steppens to 1 in 105, but here *Dunedin* was still doing 49 an hour, and *Midlothian* had worked up from a 20-mile speed restriction to 46 m.p.h.! The final mile at 1 in 100 to mile-post 29 produced minima of 43½ and 42 m.p.h. Such figures would be noteworthy wherever run, and yet over this route they represent the common driving practice.

Pitfall slacks entail very slow running on to Thornton; then follows Markinch bank—1 mile at 1 in 129, ¾ level and 1¾ at 1 in 102 to Lochmuir—whereon we accelerated to 49½ and 47 m.p.h. on the short Markinch "level," and topped Lochmuir at 43½ and 38½ m.p.h. Speed was rigidly restricted down Falkland Road bank, not exceeding 66 m.p.h. on either run, and was reduced to 30 and 40 m.p.h. on the respective trips through Ladybank; after this *Midlothian* attained 65 before Cupar, slacking there to 40 for p.w. repairs, and 66 at Leuchars Junction, falling to 53 after St. Fort, whereas *Dunedin's* figures were 64½, 61½ (reduced to 50 by adverse signals) and 45½ m.p.h. From Lochmuir to St. Fort is the only section of the journey on which any fast running is permissible, the times on the two journeys for this 19·7 miles

TABLE VII.

L.N.E.R. (N.B. SECTION).—DUNDEE - EDINBURGH.

Distance.	Engine No. .. / Engine type .. / Load (axles) .. / ,, (tons tare) .. / ,, (tons full) ..	Schedule.	*3384 4-4-0 41 278 295	†9875 4-4-2 46 343 300
miles		min.	m. s.	m. s.
0·0	Dundee	0	0 00	0 00
2·7	Tay Bridge South	8	7 45	8 15
4·6	St. Fort	—	10 10	10 35
8·3	Leuchars Jc. ..	14	14 10	14 20
14·6	Cupar	—	20 55	20 30
16·9	Springfield.. ..	—	23 25	22 45
20·1	Ladybank Jc. ..	28	27 05	26 05
24·3	Lochmuir Summit	—	33 05	31 30
		—	‡p.w.s.	§p.w.s.
28·5	Thornton Jc. ..	39	38 55	36 10
30·2	Mile-post 29 ..	—	41 50	38 55
				‖sigs.
33·3	Kirkcaldy	—	45 25	42 45
			¶p.w.s.	‖p.w.s.
36·4	Kinghorn	—	51 25	46 25
39·0	Burntisland** ..	53	54 30	50 40
43·2	Dalgetty Summit..	—	61 00	57 35
46·0	Inverkeithing** ..	63	64 55	61 45
48·0	Forth Bridge N. ..	67	69 20	66 30
49·7	Dalmeny	70	72 40	70 50
52·7	Turnhouse ..	—	76 05	stop.
55·7	Saughton	—	79 05	
58·0	Haymarket ..	80	81 40	—
			sigs.	
59·2	Edinburgh (W.)	83	85 05	—

* G.C. "Director" class. † *Midlothian.*
‡ 10 m.p.h. § Slight check. ‖ Moderate check.
¶ 5 m.p.h. ** Severe service slack.

being 21 min. 40 sec. on both runs, or 21 and 21¼ min. net.

North of Dundee I have no space in

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which to tabulate or describe at length the continuations of these journeys; suffice it to say that No. 9868, *Aberdonian*, with 295 tons (the load being increased to 41 axles by the addition of the Glasgow portion), gained 70 sec. on the 22 min. booking from Arbroath to Montrose, and ran from there to Stonehaven in the smart time of 33 min. 35 sec. (allowed 36 min.), which entailed a minimum rate of 34 m.p.h. up 3 miles mostly at 1 in 104–118, past Marykirk, 45 sustained up 3 miles at 1 in 169–191 from Fordoun, and 42½ up the final 1 in 141 to Carmont. No. 9869, *Bonnie Dundee*, with 300 tons, on the other journey, cut the 23-min. allowance to Arbroath by a minute, the 22-min. schedule on to Montrose by the same amount, deducted 1¼ min. from the 36 min. allowed from Montrose to Stonehaven, and finished up with a gain of 35 sec. on 23 min. allowed thence to Aberdeen—an entirely satisfactory performance. I have had to spare a corner however, for the tabulation of my up run on the 7·35 p.m. "sleeper" out of Aberdeen behind *Aberdonian*; the load was less than on previous trips which have appeared in these columns, but the hill-climbing was finer than ever. Maximum and minimum speeds appear in the table; it is only necessary to note the sequence of grades corresponding. They are: out of Aberdeen, 1 in 96 to Ferryhill, then 1 in 271–344 to Craiginches, 1 in 118–154–116–102 to a mile above Cove (34 m.p.h.), and 1 in 164–153 on to mile-post 234; out of Stonehaven, 1 in 91–107 for over 2 miles, then 423 for ¾-mile, then 91–110 for 1¾ miles, and easy grades on to Drumlithie; out of Montrose, 1 in 88 for 1¾ miles, and 1 in 111–148 on to mile-post 85¾. All these climbs were finely achieved, the most noteworthy feat being to gain 1½ min. to Montrose from Aberdeen, despite the Stonehaven conditional stop. With these speeds a non-stop run could have been made in 51 min.

South of Dundee two runs are tabulated, one behind a "Director" 4–4–0, and the other behind an "Atlantic," with a heavy train. The "Director" was hampered by two very severe p.w. checks, one to 10 and the other to 5 m.p.h, costing between them at least 4½ min., but made a net time of 80 min. from Dundee to Edinburgh. *Midlothian* was slacked much less severely, and her net time to the Dalmeny stop was about 69¼ min. No. 6384 had attained 45 m.p.h. on leaving the Tay Bridge, touched 67 at Leuchars Jc., and ran entirely between the limits of 64½ and 51½ m.p.h., thence to Ladybank, mostly against the engine, and including 3 miles up at 1 in 160. Minimum up

TABLE VIII.

L.N.E.R. (N.B. SECTION).

7.35 P.M. ABERDEEN–DUNDEE.

Distance.	Engine, 4-4-2, No. ,, name .. Load (axles) .. ,, (tons tare) ,, (tons full)..	Schedule.	9868 *Aberdonian.* 41 278 295	* Speeds.
Miles		min.	m. s.	m.p.h.
0·0	Aberdeen.. ..	0	0 00	—
0·6	Ferryhill Jc. ..	2	2 15	39
4·8	Cove Bay.. ..	—	9 20	34
—	Mile-post 234 ..	—	13 00	40½
11·6	Muchalls	—	17 55	—
16·2	Stonehaven ..	pass	24 15	—
		26	25 10	—
21·6	Carmont	—	36 05	†35½
23·3	Drumlithie ..	—	38 25	—
27·3	Fordoun	—	42 05	71½
30·6	Laurencekirk ..	—	45 05	57
33·8	Marykirk.. ..	—	48 20	72½
38·0	Kinnaber Jc. ..	54	52 40	30
40·7	Montrose	58	56 25	—
4·2	Mile-post 85¾ ..	—	8 40	35
7·5	Inverkeilor ..	13	12 40	—
10·7	Letham Grange ..	—	16 35	—
13·6	Arbroath	21	20 35	—
1·8	Elliott Jc. ..	—	3 30	49½
6·2	Carnoustie ..	—	8 55	59
13·1	Broughty Ferry ..	15	16 05	60
16·3	Camperdown Jc.	20	19 35	—
17·0	Dundee	23	21 20	—

* Maximum and minimum speeds, by chronograph.

† Attained 40 m.p.h. on 1 in 423, and fell to 35½ before summit.

3¼ miles at 1 in 95–111 to Lochmuir was 32 m.p.h., up the 2¾ miles at 1 in 100 to Dalgetty 36, and up the 2 miles at 1 in 70 on to the Forth Bridge about 20 m.p.h. The two last-mentioned banks are commenced at low speeds by reason of service slacks. *Midlothian* touched 64½ m.p.h. at Leuchars, 66 at Cupar, and 64½ at Ladybank, making in fact, a very fine start; minimum at Lochmuir was 34 m.p.h., followed by a maximum of 63½ before Thornton, a slack to 51 there, and a minimum of 34 at mile-post 29; 64½ m.p.h.

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was reached through Kirkcaldy, the minimum at Dalgetty was 38½ and at North Queensferry it was 23 m.p.h. This was quite a notable run for the extraordinarily difficult route concerned.

TABLE IX.

L.N.E.R. (N.B. SECTION).

EDINBURGH-CARLISLE.

Distance.	Engine, 4-4-2, No. ,, name .. Load (axles) .. ,, (tons tare) ,, (tons full) ..	Schedule.	9879 *Abbotsford* †42 †269 †285	Speeds.*
Miles		min.	m. s.	m.p.h.
0·0	Edinburgh ..	0	0 00	—
3·0	Portobello ..	5	4 50	50
4·3	Niddrie Jc. ..	7	6 55	37½
8·3	Hardengreen Jc.	12	12 00	47
12·0	Gorebridge ..	—	19 15	23½
14·1	Borthwick Bank ..	—	24 35	30
16·0	Tynehead	—	28 35	25½
18·0	Falahill	33	32 55	28½
26·7	Stow	—	42 20	64‡
33·5	Galashiels ..	51	50 20	—
3·7	Melrose	6	6 25	—
3·3	St. Boswells† ..	7	6 50	—
4·6	Belses	—	7 45	—
12·3	Hawick	16	16 45	—
				32
3·9	Stobs	—	9 20	28
7·0	Shankend ..	—	15 35	32½
10·9	Whitrope	25	24 10	23
13·0	Riccarton Jc.§ ..	28	27 00	35
				68
21·1	Newcastleton ..	36	35 30	60
28·7	Penton	—	43 15	64
31·3	Riddings Jc. ..	—	45 40	67
35·8	Longtown Jc. ..	52	50 15	55½
41·0	Harker	—	55 15	58½
43·8	Canal Jc... ..	60	58 30	—
			sigs.	
45·4	Carlisle	64	62 15	—

* Maximum and minimum speeds by chronograph.

† 34 axles = 216/230 tons, St. Boswell's to Carlisle.

‡ Maximum on descent.

§ Service slack.

Last of all, and completing my notes of practically every Scottish main line over which express running is performed (except Berwick to Edinburgh and Perth to Aberdeen), I have tabulated an excellent south-bound run from Edinburgh to Carlisle by the Waverley route. Here again, the maximum and minimum speeds are noted in the log, and brief notes in reference to the gradients alone need to be added. From Portobello to Niddrie is a rise of 1 in 80; from there to Hardengreen the rise is 1 in 175–250; and save the last mile (at 1 in 100) to Falahill, from Gorebridge to above Tynehead is entirely as 1 in 70. Similarly out of Hawick, miles roughly at 1 in 72–75, 112–123, 77, 80, 80, 117, and 121 succeed one another to Shankend, after which come 2½ miles at 1 in 75 and a mile at 1 in 96 to Whitrope. The consistency of the hill-climbing on this route is wonderful; time and again one passes the summit points dead on time, as was the case here at Falahill, where we were 5 sec. early, and Whitrope, reached in a minute under the time allowed, The running over the N.B. Section of the L.N.E.R. must, indeed, be some of the most punctual in Great Britain, which is the more to the credit of drivers and all others concerned, in view of the gradients of the main lines. The best running on this journey was forward from Hawick; but for a concluding signal delay we should have economised 2½ min. on the 64-min. booking to Carlisle, and, as will be seen, we covered the 28 miles from Riccarton to Harker in 28¼ min. So much for current Scottish locomotive performance; I only wish more space were available in which to do it justice.

I regret that, by an oversight, for which I must tender apologies to the gentleman concerned, the name of the Nine Elms driver with whom I enjoyed the fine run on the footplate of *Sir Gaheris* from Waterloo to Salisbury, described in last month's issue was given as Barber, instead of W. Bailey, who was responsible. The fireman's name was shown correctly as Woodley. Diameter of the cylinders of the "King Arthur" class 4-6-0 engines was also given inadvertently as 19½ in.; 20½ in. diameter by 28 in. stroke are, of course, the actual dimensions.

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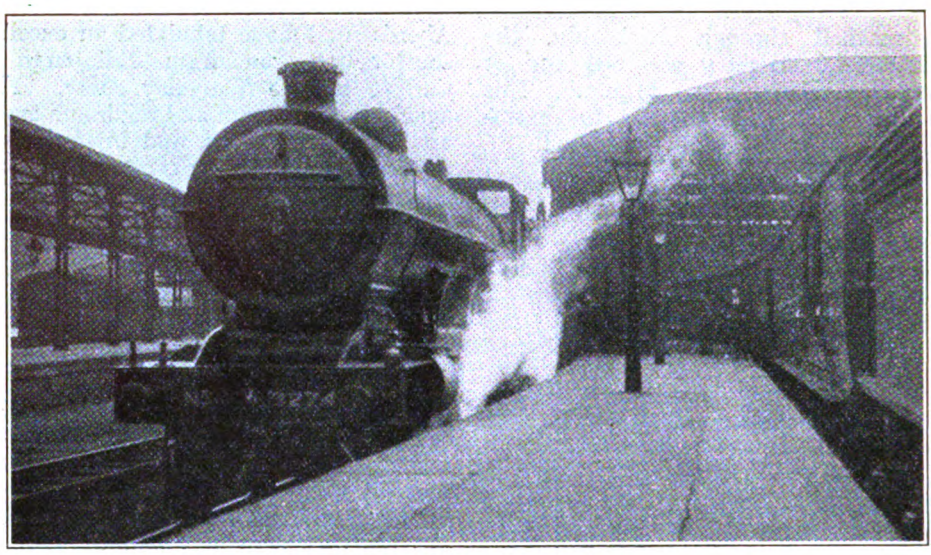

Photo.] [*J. F. Gairns.*

G.N. 4-4-2 LOCOMOTIVE No. 3274 AT HARROGATE AFTER WORKING EDINBURGH PULLMAN CAR EXPRESS NON-STOP FROM LONDON

To Edinburgh by Pullman.

ALTHOUGH the now well-known "Edinburgh Pullman" express of the L.N.E.R. is also very generously patronised by passengers between London and Harrogate and Ripon, it is rapidly growing in favour for through East Coast traffic, and since it was expedited on September 21 last to complete the journey to Edinburgh in 8¼ hours, it has taken its place as one of the popular and standard East Coast expresses. It is true that for the average traveller, and especially the business man, the 10 a.m. departure of the "Flying Scotsman" from King's Cross is a most convenient time, as witnessed by the large numbers of passengers it takes every day of the week and the frequent necessity for running the 9.50 a.m. relief, even during the few months that train is not shown in the public time-tables. But for passengers whose journeys are not governed by business considerations, and for ladies and invalids, the departure of the Edinburgh Pullman at 11.20 a.m. enables the journey from residence to King's Cross to be made clear of the morning traffic pressure and without any of the rush which may be associated with travel by the 10 a.m. if a more or less complicated journey has to be made first. From the business man's point of view, too, the train is often convenient, in that he has time to look in at his office to reply to urgent letters and to give instructions in regard to other matters.

It is for these and other reasons that the Edinburgh Pullman express has become quite a favourite train, while the special character of the accommodation appeals to many people. It is true that the East Coast trains include vehicles which rank among the finest in ordinary service on the L.N.E.R. or other lines, while the fact that no supplements are charged is a big consideration. For those to whom the supplementary charges (relatively very moderate) are not a matter of importance, the special accommodation is regarded as good value, more especially in view of the fact that the Pullman cars in use are of the latest types and among the best of the Pullman cars in service.

Apart from these aspects, however, considerable interest attaches to the running of the Edinburgh Pullman Car express, and the following notes of a recent journey, on its present 8¼ hours timing introduce many items worthy of remark.

Since the division of the Leeds and

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Bradford and Harrogate, Newcastle and Edinburgh trains, as from September 21 last, the latter has usually consisted of five third and one first-class cars and a standard East Coast bogie van, representing a load of about 255 tons. Practically every seat, a large proportion reserved beforehand, was occupied in the third-class cars as far as Harrogate, as well as a fair number in the first-class car, but beyond Harrogate many seats became vacant, though there were a number of throughout passengers, and a few joined at various stages of the northward journey.

Although the preceding Leeds and Bradford Pullman car express had gone out worked by one of the Great Central four-cylinder 4-6-0 locomotives, as usual when one train only was run, the Edinburgh train was worked by one of the well known Great Northern "Atlantics," No. 3274. The start was easy, but through the tunnels the engine was inclined to slip, so that 7·2 mins. were taken to pass Finsbury Park at about 30 m.p.h. Running thence to Potters Bar summit was, however, quite good, the 10·2 miles occupying 12·5 mins. Then came some very fine running, Hitchin being passed in 18·7 mins. (19·2 miles), Huntingdon (46·2 miles) in 42·3 mins., and Peterborough passed slowly in 59·9 mins. (63·7 miles) from passing Potters Bar, so that the 76·4 miles from London had occupied 79·5 mins. The 23·7 miles, largely on ascending grades, to Stoke box were run in 26·7 mins., and Grantham passed in 111·3 mins. from London (105·5 miles). The 14·6 miles to Newark occupied 13·6 mins.; the 18·5 miles to Retford were run in 20·3 mins.; and to Doncaster, after a long easing from Rossington and through the station at a bare 30 m.p.h., the 17·4 miles took 17·4 mins. The 156 miles from London had thus been covered, without any sensational maximum speeds, in 161·6 mins.

The remainder of the route to Harrogate is necessarily complicated by checks for junctions and curves, so that a high average speed is impracticable, though No. 3274 did good work wherever possible. Consequently, the 14·7 miles to Knottingley (reduced speed) took 19·6 mins. while the 3·2 miles to Burton Salmon occupied 5·6 mins. Thence to Church Fenton the 6 miles took 7·2 mins., with some good running intermediately, but the transfer from one set of tracks to the other, in order to diverge from the York line to the north-west, entailed a severe speed reduction. The remaining 18·5 miles to Harrogate occupied 25·5 mins., so that the 198·4 miles from London had been covered in barely 220 mins., or 3 mins. under booked time.

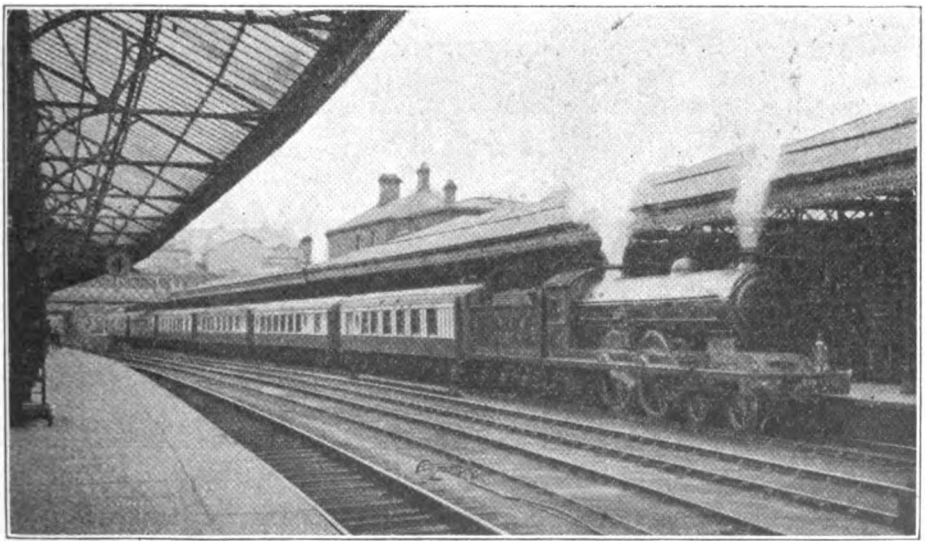

Photo.] [*L.N.E.R.*

KING'S CROSS-HARROGATE-EDINBURGH PULLMAN CAR EXPRESS AT HARROGATE.

North Eastern Area Locomotive attached for Harrogate-Newcastle stage.

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For the next stage a "Pacific" locomotive was attached, No. 2578, though the route continues for some time to be unsuitable for high average speed bookings. The start to stop run of 11·5 miles to Ripon occupied barely 14 mins., and, with several checks, the 13·7 miles to Northallerton (pass) were run in 18·6 mins. Thence to Darlington running was spoilt by severe checks, so that the remaining 14 miles took 19·7 mins.

Leaving again, Durham was passed in 29 mins. from Darlington (22 miles), and the 14 miles to Newcastle took 18·5 mins.

At Newcastle, No. 720, one of the first three-cylinder 4–4–2's was attached, and, with allowance for the severe gradients in places and the occasional checks for curves, did good work in running the 67 miles to Berwick in 79·7 mins. Starting again, Grants House (16·3 miles) was passed in 26·2 mins., and the summit tunnel was entered 2 mins. later. Down Cockburnspath bank speed had to be occasionally checked, but eventually Waverley (Edinburgh) was reached in 74·4 mins. from Berwick (57·5 miles), so that the arrival, notwithstanding delays on the Ripon–Darlington stage, was a bare half-minute late.

Altogether the run was one of great interest, in that, apart from the special comfort incidental to Pullman travel, and the fact that the schedule of the Edinburgh Pullman now equals that of the standard East Coast expresses, the route is one having many attractions. From London to Doncaster may be described as the "speed" stage—thence to Newcastle one is introduced to the complexities of our railway system, while the traverse of industrial areas is pleasantly diversified by beautiful hill country and the crossing of picturesque valleys and rivers by high viaducts. North of Newcastle there is much of scenic interest. The approach to Berwick from Tweedmouth includes attractive views of the coast as the railway swings round to cross the famous Royal Border Bridge. Beyond Berwick is one of the most interesting stages of the East Coast route as a whole. But it is not until one leaves Waverley Station that the traveller visiting Edinburgh for the first time can realise the peculiar attraction which the Scottish capital has for the tourist.

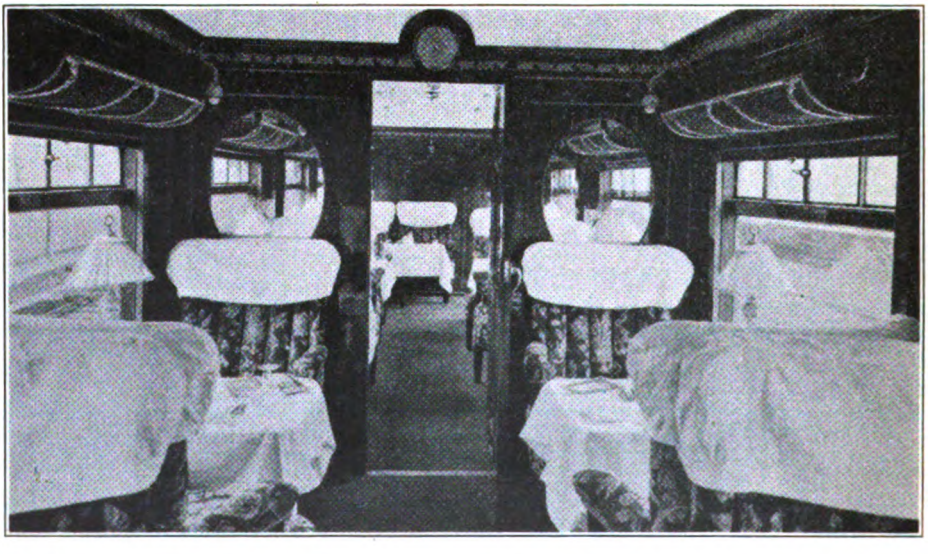

Photo.] [*Topical.*

INTERIOR OF FIRST-CLASS PULLMAN CAR, HARROGATE AND EDINBURGH PULLMAN TRAIN.

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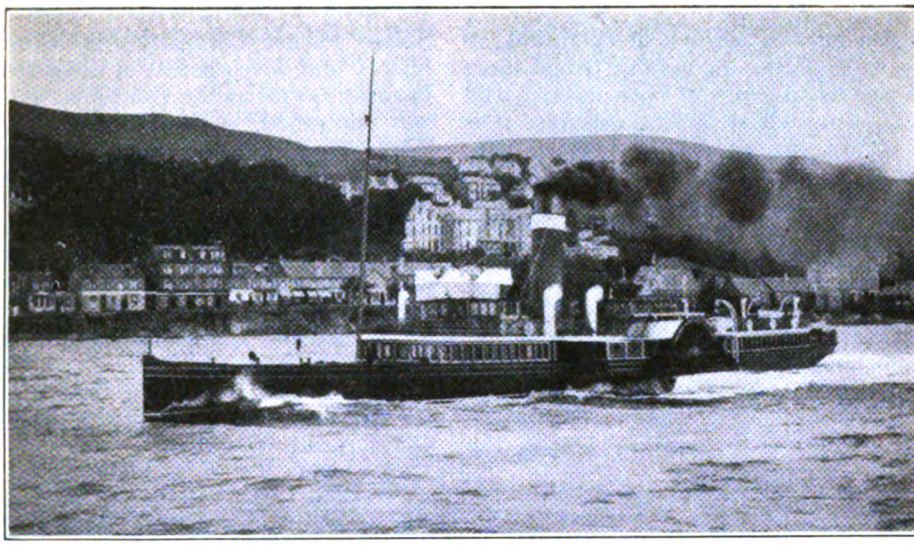

Photo.] **L.N.E.R. STEAMER "TALISMAN" OFF INNELLAN.** [*C. J. L. Romanes.*

Clyde Rail and Steamer Services.—I.

By "INDICATOR."

THERE are, of course, many places in the British Isles where, in order to provide communication with adjacent islands or places separated from the main system by a waterway, railway-owned steamers are operated, so that the places served, even although they may have no actual railway services of their own, are, to all intents and purposes, given the benefit of such facilities. In the case of the Firth of Clyde, however, the situation is far more complex, in that the need arose, at quite an early date, for giving access to places to which an all-railway route would have been entirely impracticable, as it would have involved a detour of perhaps forty or fifty miles, even if a railway could have been constructed. The area in question, moreover, was already fairly well populated, while the scenic attractions of the districts were fully recognised by the inhabitants of Glasgow and adjacent towns. As a result, it early became necessary to provide steamer services to these places, or some of them. At first the steamers sailed from Glasgow itself, but even in the 'fifties of last century it was realised that there was much to be said for restricting the steamer services to the inevitable portions of the journey, utilising rail to reduce the time occupied and to avoid the less interesting stages of the river transit. Thus, there has been developed, during the last half-century or so, a service of railway-owned steamers operating in all directions throughout practically all parts of the Firth of Clyde, providing in the aggregate facilities for which there is no comparison elsewhere.

It is true that, besides the railway steamers, a number of privately owned boats are in service, and some of these maintain railway connections. Most of the private boats, however, ply from or to Glasgow itself, although, as they call at the railway piers, they are in some cases utilised to maintain connections. The main point is, however, that Clyde facilities as a whole are based primarily upon the routes served by the railway steamers, in conjunction with the various rail routes on the mainland, while, speaking generally, the private boats cater chiefly for holiday and tourist traffic only. Indeed, except during the summer months, there are very

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few non-railway services in operation, so that, while during the holiday period there is a wonderful series of both railway and privat y owned steamship services, it is left almost entirely to the railway companies concerned to maintain facilities durin the remainder of the year. During the winter months even the railway services are, of course, reduced to the necessary minimum, though, as there are quite a number of places having a permanent population, in addition to people whose circumstances or employment entail all-the-year-round residence, at least a nucleus service is, obviously, required during the whole of the twelve months. During the holiday period the railway services are considerably amplified, and, while providing the needful basic facilities on a generous scale, a large amount of purely pleasure touring is catered for by the railway steamers, as well as by those otherwise owned.

Reference has been made to Clyde facilities in the pages of the RAILWAY MAGAZINE on a number of occasions, and we may refer particularly to an article by Mr. Arthur H. Tatlow, published in the August, 1902, number, while a feature of the special Caledonian Railway Diamond Jubilee number (September, 1907) was an article by Captain J. Williamson (then Steamer Superintendent, The Caledonian Steam Packet Company), in which the history and development of Clyde steamer facilities, so far as the Caledonian Railway was concerned, were set forth in detail. While speaking of railway-owned steamers, it is necessary to explain that, although the late North British and Glasgow and South Western Railways actually owned the steamers used for their services, in the case of the Caledonian Railway there was a subsidiary company, The Caledonian Steam Packet Company, in which the Caledonian Railway had a controlling interest, so that, nominally, the boats were not railway-owned, though to all intents and purposes they were.

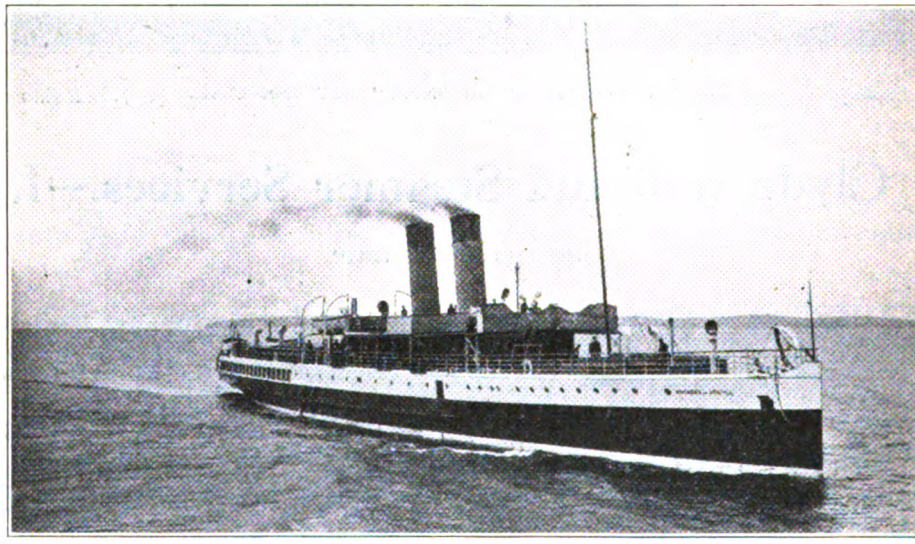

Photo.] L.M.S. TURBINE STEAMER "DUCHESS OF ARGYLL." [*J. F. Gairns.*

Consequent upon the formation of the London Midland and Scottish Railway, the Caledonian Steam Packet Company's boats, together with those of the Glasgow and South Western Railway, have become associated, under Mr. C. A. Bremner, Superintendent. In the case of the London & North Eastern Railway, steamship arrangements on the Clyde are under Mr. L. H. Gilchrist, the company's Marine Superintendent. Similarly Mr. Gilchrist has charge of the Joint L.M.S. & L.N.E. steamers on Loch Lomond (a matter of arrangement between the two companies), as well as the steamer and ferry services between North and South Queensferry, and between Granton and Burntisland.

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Mr. Bremner has also general oversight of L.M.S. steamship services in other parts of Scotland, including the Larne and Stranraer steamers, and boats plying on Loch Tay and Loch Awe, besides incidental responsibilities, such as the chars-à-bancs used between Oban and Ford for the purpose of certain circular tours and other facilities from Oban mentioned in an article elsewhere in this issue.

Some years ago, arrangements were made, between the three railways then concerned, for a form of pooling traffic common to all, and for arrangements whereby overlapping and duplicative services could be avoided. Privately owned steamers, in so far as they carried passengers travelling with combined rail and boat tickets, and so far as they maintained connections with the railways, were also included, though mainly for the purpose of correlating traffic and avoiding complications due to the varied interests involved. As these arrangements had been in force some time prior to grouping, it has been convenient to maintain them practically as they were, except that The Caledonian Steam Packet Company's and the late Glasgow and South Western steamers have become generally available for L.M.S. services, so that relatively few changes in arrangements and methods have been necessitated by the post-grouping situation.

So afar as the L.M.S.R. is concerned, there are no fewer than seven mainland piers served by the railway steamers, Greenock (Prince's Pier), Gourock, Wemyss Bay, Largs, Fairlie, Ardrossan and Ayr. The London and North Eastern Railway steamers ply only from Craigendoran pier, from whence they serve the favourite resorts of Dunoon and Rothesay, together with several smaller places, while some of the routes along the northern reaches of the Firth of Clyde are served mainly, if not exclusively, by their boats. The southern reaches, particularly places more conveniently accessible from Largs, Fairlie, Ardrossan and Ayr, depend entirely upon L.M.S. steamers, while the geographical situation and the fact that the L.M.S. includes two of the three railways previously providing for Clyde requirements naturally means that the London Midland and Scottish Railway is the predominating factor in Clyde traffic.

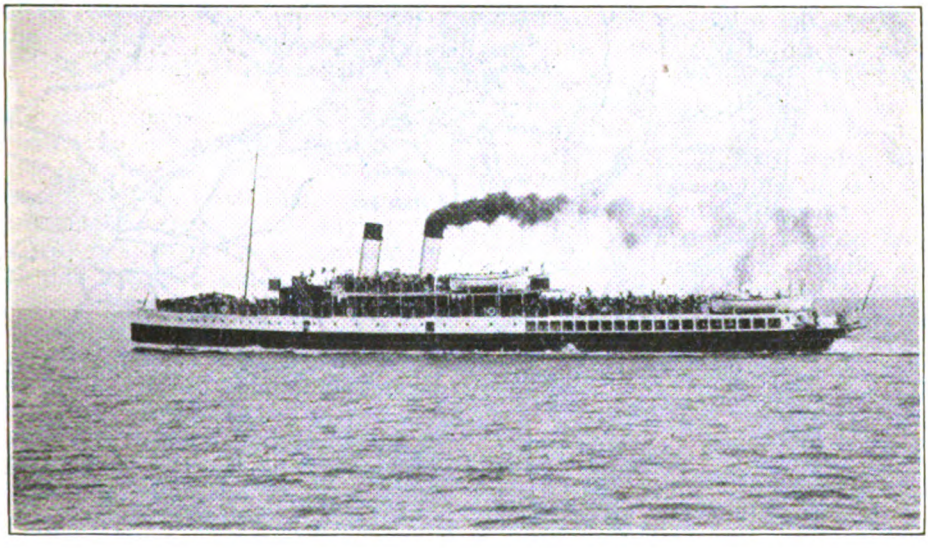

Photo.] [*C. J. L. Romanes.*

NEW L.M.S. TURBINE STEAMER, "GLEN SANNOX," LEAVING BRODICK (ARRAN).

Caledonian Railway steamer facilities date back to quite early days, being based upon those of the Scottish Railway and Steamboat Company, which, in the 'forties, inaugurated rail and steamboat services to the coast via Greenock. These facilities were considerably amplified during the

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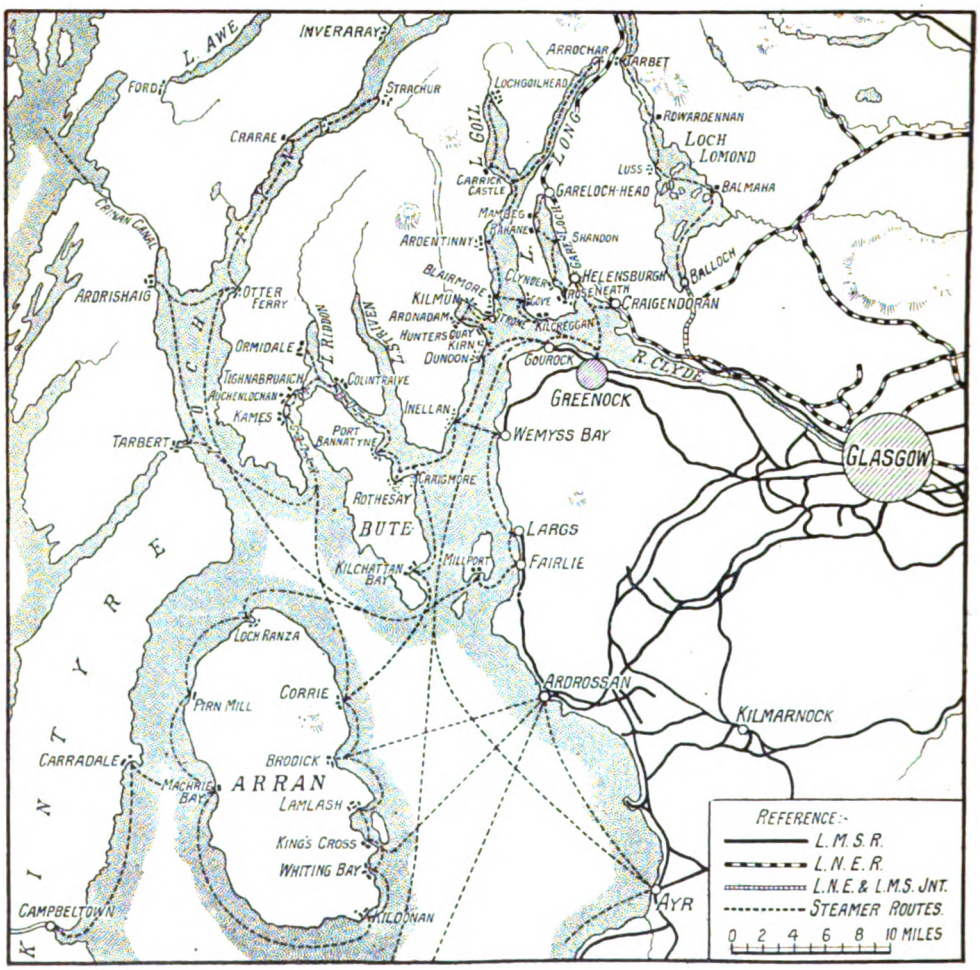
'fifties, while the opening of the Wemyss Bay branch in 1865 gave the Caledonian special advantage in regard to traffic to and from Rothesay, even then the largest and most popular of the Clyde resorts. These facilities also served Largs and Millport, in that Largs was not then served by rail as it is to-day. It was, however, during the 'nineties that the railway fleets received their principal development, from which period the older boats still in service date, though there are also steamers fully representative of advanced practice for boats of their class.

It was during the 'nineties, too, that other routes were developed, partly because of the rivalry of the period between the Caledonian and Glasgow and South Western Railways (with the North British as a by no means unimportant third party), but also because of the fact that certain other ports provided shorter and more direct routes to places relatively distant from Greenock, Gourock, Wemyss Bay and Craigendoran. Thus, railway steamers began to ply from Ardrossan and Arran in 1890, while at about the same time services were inaugurated from



MAP OF THE FIRTH OF CLYDE SHOWING RAILWAY AND STEAMER ROUTES.

The principal steamer routes are indicated by dotted lines, whether operated by railway or privately owned vessels.

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Largs and Fairlie to Millport. From Ardrossan, by the way, until correlating arrangements were made, both Caledonian and Glasgow and South Western steamers were operated, plying from different piers, each service having its own train connections. Indeed, a feature of the railway-operated services on the Clyde as a whole was, for quite a long time, the intense competition between the railways concerned, this accounting in some degree for the extension of the Caledonian line from Greenock to Gourock, opened in 1889, its primary purpose being to give the Caledonian Railway the advantage of a three-mile reduction in the steamer distance for Dunoon and places on the northern reaches of the Clyde, comparable to the advantage already realised in regard to Rothesay by the Wemyss Bay route.

All such competitive factors have, however, long since given place to co-ordination and correlation, as already indicated, with the result that, although a degree of competition necessarily applies as to the relative merits of the Craigendoran and Greenock and Gourock routes, and between the railway and the privately owned steamers, overlapping and purely competitive mileage has long been practically eliminated, to mutual advantage. Further, in several instances, steamers combine calls in connection with the mainland train services at both Greenock (Princes Pier) and Gourock, and, further south, Wemyss Bay, Largs and Fairlie, while London and North Eastern steamers run across from Craigendoran to Greenock (Princes Pier) to enable passengers to connect with steamers on other routes. The same sort of thing occurs, too, at Dunoon and elsewhere, in that it is often practicable to travel by one boat to a changing pier and to continue on another steamer which originated from a different mainland pier; also to interchange with privately owned steamers making journeys not covered by the railway steamer services.

There are, as will be seen, several railway steamer routes of a special character, particularly during the summer months, as to which reference will be made later, but, speaking generally, the following are the standard routes operated exclusively or mainly by railway steamers.

Wemyss Bay to Rothesay.
Greenock or Gourock to Dunoon and Rothesay, with occasional extensions towards or through the Kyles of Bute.
Greenock and Craigendoran to Gareloch Piers.
Greenock and Gourock to Loch Goil Piers.
Wemyss Bay, Largs and Fairlie to Millport.
Ardrossan to Arran.
Craigendoran to Dunoon and Rothesay.
Craigendoran to Loch Goil and Arrochar.
Greenock, Gourock and Craigendoran to Inveraray and Ardrishaig.

Privately owned steamers operate on a number of special routes, through the Kyles of Bute to Inveraray, Ardrishaig and Islay, and through the Crinan Canal to the Inner Hebrides, also southwards to Campbeltown, as well as serving Dunoon, Rothesay, &c., partly in competition and partly in association with the railway facilities. A special feature of the summer services is the railway steamer day trip through the Kyles of Bute to Arran, generally worked by the Caledonian turbine steamer *Duchess of Argyll*, as to which reference will be made later.

In that Rothesay and Dunoon may be regarded as dominating Clyde traffic facilities, it will be of interest to compare their rail and steamer distances from Glasgow by the respective routes.

Via		To	Rail Miles.	Steamer Miles.
Greenock ..	..	Dunoon	25½	6¾
Gourock ..	..	,,	26¼	4½
Craigendoran	..	,,	23¼	8
Greenock ..	..	Rothesay	25½	15¼
Gourock ..	..	,,	26¼	13
Craigendoran	..	,,	23¼	16½
Wemyss Bay	..	,,	31	6¾

This shows that, except for Wemyss Bay, there is not a great deal of difference between the rail distances, though the variations in water distance were sufficient, under competitive conditions, to give certain routes advantages in regard to particular places. Now, the question of route is largely governed by the particular service given, so far as through traffic is concerned, while otherwise each route has its own special facilities in regard to intermediate stations, including the availability of Glasgow stations other than the principal ones. Thus, both the Caledonian and the Glasgow and South Western routes serve Shields Road, south of the Clyde, and Paisley, but have quite diffe-

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rent routes beyond, the G. & S.W. route being carried over the hills to approach Greenock from inland, on its way serving several important and favourite residential districts, while the Caledonian line follows the river fairly closely, with stations convenient for both residential and industrial populations adjacent. The L.N.E.R. route to Craigendoran includes several Glasgow stations, which are more convenient than Queen Street for many passengers, while, in following the north bank of the river, it provides facilities for several busy districts and for the town of Dumbarton.

For the most part, however, whatever the route, the bulk of the traffic is between a Glasgow principal station and a Clyde port, so that many of the steamer trains are actual expresses, making one or two stops only, if not booked without a stop throughout. This applies, too, in regard to the Ardrossan, Fairlie and Ayr routes, as well as to the services via Greenock, Gourock, Craigendoran or Wemyss Bay, as will be seen. A further interesting point is that frequently a particular boat, or a group of steamers where several constitute a group, has two or more rail connections. Moreover, during the summer months, there are a few through trains from places other than Glasgow, including special expresses for Edinburgh visitors.

While considering train services, it will be convenient to include a few remarks as to the boat expresses on each route and the facilities at the pier stations, thus leading the way to consideration of the associated steamer services.

Although the Caledonian route also serves Greenock, the boat traffic from and to Glasgow is mainly operated by the Glasgow and South Western route and Princes Pier station. The pier itself is wide and long enough to take several steamers simultaneously, and yet have room for tenders waiting upon trans-Atlantic and other liners anchored in mid-stream, not to mention a tramp or coasting steamer or two. Once or twice a week, and generally on Saturdays, Princes Pier is quite busy as a liner station, with several special boat expresses running, in addition to the Saturday pressure of the Clyde traffic.

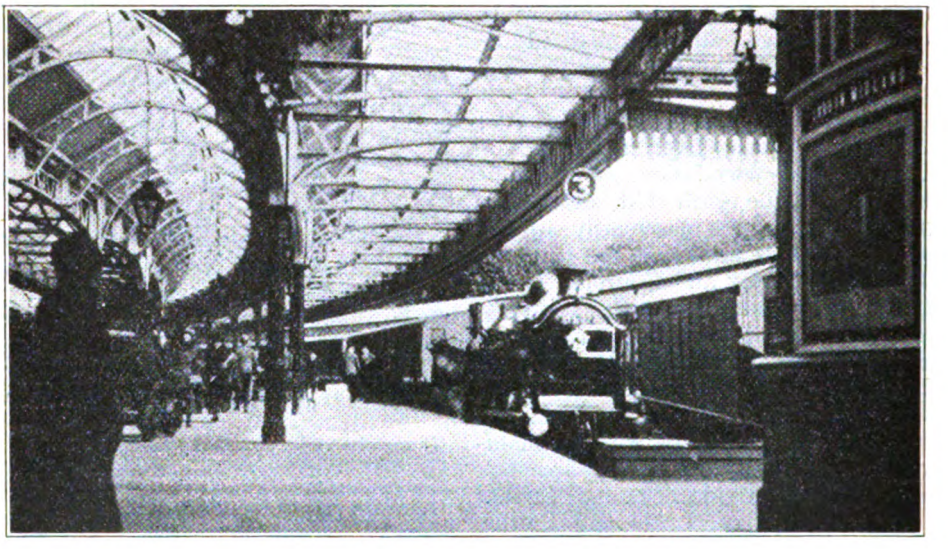

Photo.] GLASGOW TRAIN AT WEMYSS BAY STATION. [*J. F. Gairns.*

The station has two long and wide double-sided platforms and a spacious circulating area, from which direct stairways lead down to the pier, in the centre, and two curved covered ways right and left to serve the eastern and western ends. Actually, only that to the left is now used for this purpose, that to the right having been fitted up to serve as an examination room for trans-Atlantic passengers, including in the case of the steerage, medical examination on behalf of the United States

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Government. This arrangement enables the liner traffic, both inwards and outwards, to be kept quite separate from the Clyde traffic, especially when a section of the pier is barriered off for use by the tenders waiting upon liners.

The following trains from St. Enoch rank as boat trains, some being expresses, as indicated: 7.30*, 8.5*, 9.24* a.m., 12.5*, 1.45* (S.O.), 2.40* (S.O.), 3.5. (Fridays only), 4.3, and 6.3 p.m. (Tues., Weds., and Thurs.) Of these the 8.5* a.m., 1,45* (S.O.) and 4.3.* p.m. call at Paisley only, and the 12.5* p.m. at Shields Road and Paisley. There is also a relief on Saturdays to the 1.45* p.m. at 1.40* p.m. non-stop from St. Enoch to Greenock (Lynedoch). In connection with the 4.3* p.m., the interesting notice is given, "No luggage allowed," the implication being that the steamer connection is an important and close one and the time too limited to permit of transfer from train to boat. Similar notices are common in connection with Clyde steamers, the arrangements in such cases being that luggage is sent by the next boat or will not be handled on that particular service. The 4.3 p.m., moreover, calls at Paisley only to pick up.

In the opposite direction, the following trains from Princes Pier have steamer connections: 8.18*, 9.5*, 9.25* (M.O.), 10.15 a.m., 1.20 (M.E.), 4.25*, 5.20*, 6.10*, 7.15*, 8.15* (S.O.) and 8.20* (S.E.). Of these, the 8.18* and 9.5 are "No luggage allowed" trains, in each case calling at Paisley only, while the 6.10* and 8.15* (S.O.) trains are more or less fast. Most of the others mentioned, both up and down, make a number of intermediate stops, not a very serious item, as some of the stations are fair distances apart, and few of them call between Paisley and Shields Road, while in the up direction it is necessary to consider the requirements of passengers wishing to alight at stations other than the principal ones. Further, on Saturdays and busy days, it is quite usual for a fast relief to be run from Princes Pier to Glasgow, in addition to the stopping train, although the express is not publicly advertised.

Photo.] PRINCES PIER, GREENOCK. [*J. F. Gairns.*

Gourock, also, has quite a large pier space, suited for the handling of several steamers simultaneously, while its station, though built in a different style, is as imposing as that at Princes Pier. Here, also, there are two double-sided platforms, refreshment rooms, booking offices, &c., but, whereas at Princes Pier, the railway curves to reach the pier end-on, at Gourock the station is sidelong to the pier. The circulating area is, however, lengthened out so that traffic for several boats can be directed so as to avoid confusion, while the passage ways are wide and

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spacious. Incidentally, it may be mentioned that trains reach Gourock along the coast, and thus give good views of Gourock Bay (Gourock is a yachting centre, a holiday resort, and a favourite residential town on its own account), while outside the station are extensive sidings for storing trains.

The following trains from Glasgow (Central) to Gourock have boat connections —7.3, 8.0, 8.20, 8.35, 9.50, 10.40 (S.O.), 11.6 (S.E.) a.m., 12.50 (S.E.), 1.6 (S.O.), 1.20 (S.O.), 2.10 (S.E.), 2.25 (S.O.), 2.40 (S.O.), 3.0, 4.0 (F.O.), 5.13 (S.E.), 5.20, 6.30 (certain days only), and 6.45 p.m. Of these all except the 7.3 a.m. are more or less fast, while the 8.35 a.m., 1.6 (S.O.), 1.20 (S.O.), 2.25 (S.O.), 2.40 (S.O.), 5.13 (S.E.), and 5.20 p.m. make only one or two stops. The 1.6 and 1.20 are Saturday "No luggage allowed" trains, and the 5.20 p.m. has this restriction every day.

In the up direction the special expresses are those leaving Gourock at 8.8 (Mondays only), 8.15, 8.42, 10.0, 11.10 (S.E.), 11.45 (S.O.) a.m., 12.20, 1.25 (S.O.), 2.50, 4.10, 4.40, 4.50, 6.0, 6.30, 7.50, 8.0 (S.O.), 8.55 (S.O.), 9.40 and 10.10 p.m. Certain of these trains call for further remark. Thus, the 8.8 a.m. from Gourock on Mondays calls only at Paisley, while in the case of the 4.40 p.m. there is the significant remark that its departure is contingent on arrival of Ardrishaig steamer. Further, the 6.30 p.m. down runs on Tuesdays, Wednesdays and Thursdays. The 9.40 p.m. is advertised as serving only an *evening cruise* (to be referred to later), and is not scheduled to run when the trip is not made.

Besides the Glasgow trains there is a train from Edinburgh (Princes Street) at 6.55 a.m. through to Gourock, where it is due at 9 a.m.

A further feature is that the Gourock line of the L.M.S.R. is one of the routes where Sunday trains are operated. These run in connection with certain steamer services, there being a total of seven trains each way, stops being made only at Paisley (Gilmour Street), Port Glasgow and Greenock (Central), other stations being apparently closed. One of these trains, the 10.45 a.m. down, is, in fact, non-stop throughout, a peculiarity which does not occur even on week-days, while the corresponding up train, leaving Gourock at 6.50 p.m., calls only at Paisley.

The Wemyss Bay line leaves the coast route at Port Glasgow, and then climbs at a very steep gradient to Upper Greenock. The incline continues most of the way to Ravenscraig, and then the line—by this time in sight of the Clyde on the western side of the promontory upon which Gourock is situated—goes on to Inverkip and Wemyss Bay. Part of this section is still single-track, but enough has been doubled to enable the heavy and fast traffic frequently required to be operated without delay. The later stages of the route are quite picturesque, and this applies particularly as Wemyss Bay is approached. The station is located on the water side, and from the ends of the platforms a wide curved covered way leads direct to the pier. This station is regarded as one of the most distinctive on the late Caledonian system, in that great attention has been paid to artistic aspects. This applies also to the station buildings (which include tea-room and other facilities), as they have been the subject of special architectural treatment, in conjunction with an ornamental clock tower. The circulating area is embellished with hanging flower baskets, while provision is made for floral decoration elsewhere. The station has two double-sided platforms, with siding accommodation near by. Notwithstanding the severe grades involved, a number of quite creditable trains are operated, particularly the expresses or semi-fasts leaving Glasgow (Central) at 8.55, 9.30, 10.30 a.m., 12.56 (S.O.), 1.10 (S.O.), 2.30 (S.O.) and 4.30 (S.E.) p.m., and the corresponding return trains from Wemyss Bay at 7.25 (M.O.), 7.50 (M.E.) 8.42 a.m., 5.12 (S.E. non-stop throughout) and 5.50 (S.O.) p.m. Most other trains are, however, fairly fast, in that, as a rule, they omit some or all of the stations between Paisley and Port Glasgow. Here, also, the words "No luggage allowed" appear in regard to the 1.10 p.m. down train on Saturdays.

Although for present purposes attention is given principally to the more or less fast and express trains running in connection with steamers, it may be pointed out that the St. Enoch-Greenock, Central-Gourock, and Central-Wemyss Bay routes also carry a considerable amount of

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residential traffic, so that, beside the boat trains, there are usually fast or semi-fast trains designed to meet the needs of residential traffic to or from certain of the intermediate stations. Parts of Greenock also, particularly at the Princes Pier end, are of a residential character, but Gourock and Wemyss Bay both rank as holiday and high-class residential resorts on their own account, Gourock being, in fact, a favourite yachting centre in addition.

In the case of the L.N.E. route to Craigendoran, the principal trains are those leaving Queen Street (Low Level) at 7.55, 9.20, 10.23, 10.35, and 11.37 a.m., together with the 12.15 (S.O.), 1.0 (S.O.), 1.5 (S.O.), 1.10, 1.32, 2.4 (S.O.), 2.14 (S.O.), 4.0, 5.8, and 6.5 p.m. All of these are semi-fast and some rank as actual expresses, as in the case of the corresponding L.M.S. services on the south side of the Clyde. The principal trains in the opposite direction leave Craigendoran at 7.29 (M.O.), 7.34, 8.19, 8.25, 9.4, 9.59, 11.6, 11.50 a.m., 1.15 (S.E.), 1.52 (S.O.), 2.56 (S.O.), 3.53, 4.39, 5.33 (S.O.), 5.40, 6.20 (S.O.), 6.50 (S.O.), 6.54, 7.47 (S.O.), 7.59 (S.E.), 8.10 (S.O.), 8.23 (S.O.), 8.34, 8.55 (S.O.), 9.9 (S.O.), and 9.39 (S.O.) p.m.

Practically all these trains call at Dumbarton, and one, two or three other stations but intermediate traffic is otherwise provided for by trains other than those mentioned. Some of the boat trains, too, travel via Clydebank and Yoker, although the majority of the fast trains take the Singer route. There is also a through train from Edinburgh at 6.25 a.m. to Craigendoran direct.

At Craigendoran there is quite an elaborate passenger station end-on to the pier itself, and having refreshment rooms and other appointments. The pier will take four boats simultaneously, one alongside each of its two arms, and a walk of a few yards only is involved in transferring from train to boat, or *vice versa*. The station curves round to join the connected through station used by Helensburgh trains. Many of the trains mentioned, in fact, actually run to and from Helensburgh. Those in the down direction can either be sent first to the Pier station and then backed so as to continue to Helensburgh, or, if they use the through platform, but little addition is made to the walking distance which passengers have to cover. In the opposite direction, trains from Helensburgh usually back into the Pier station at Craigendoran before continuing their journey.

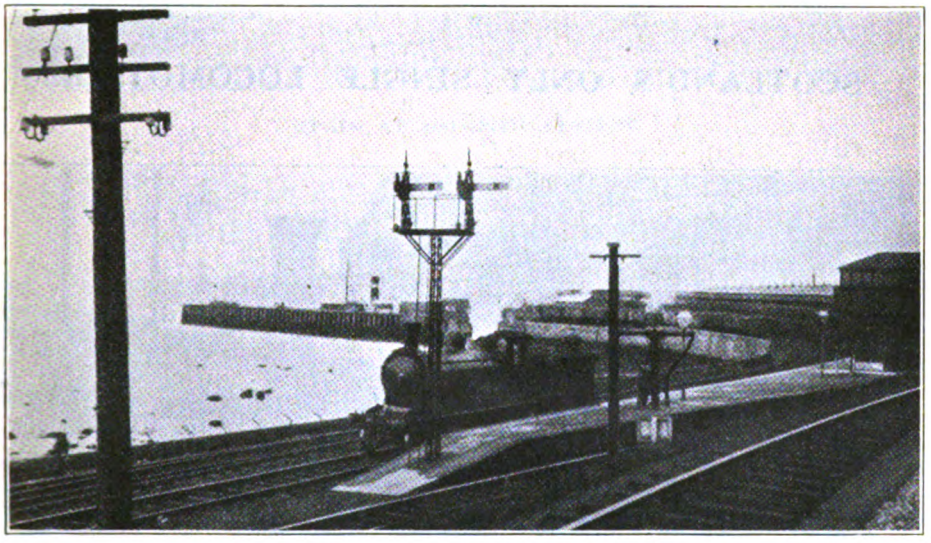

Photo.] GENERAL VIEW OF GRAIGENDORAN PIER, L.N.E.R. [*J. F. Gairns.*

Not infrequently, reliefs, not publicly advertised, are required, in that the arrival or departure of two or three steamers more or less simultaneously may require two or three trains to carry their passengers.

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A peculiar feature of Craigendoran station is that the island platform of the West Highland line, which leaves about a quarter of a mile east of the station, is on a higher level, overlooking the Helensburgh and Pier stations. The respective stations are, however, inter-connected, though, as a rule, West Highland traffic is kept quite distinct from that of the Helensburgh route, so that the inter-connection is mainly for the use of interchanging passengers and luggage transfer. One signal cabin controls working in the three stations, its elevated position giving a splendid view over the whole. As in the case of Gourock and Wemyss Bay, Craigendoran, as well as certain other stations on the route, ranks as a holiday resort on its own account, and this applies also to Helensburgh, which is a favourite residential town. Helensburgh has a pier of its own, and certain of the steamers call there, but this is for local purposes only, as Craigendoran is regarded as the real centre for interchange of Clyde rail and steamer traffic on the north side.

(*To be continued.*)

SCOTLAND'S ONLY SINGLE LOCOMOTIVE.

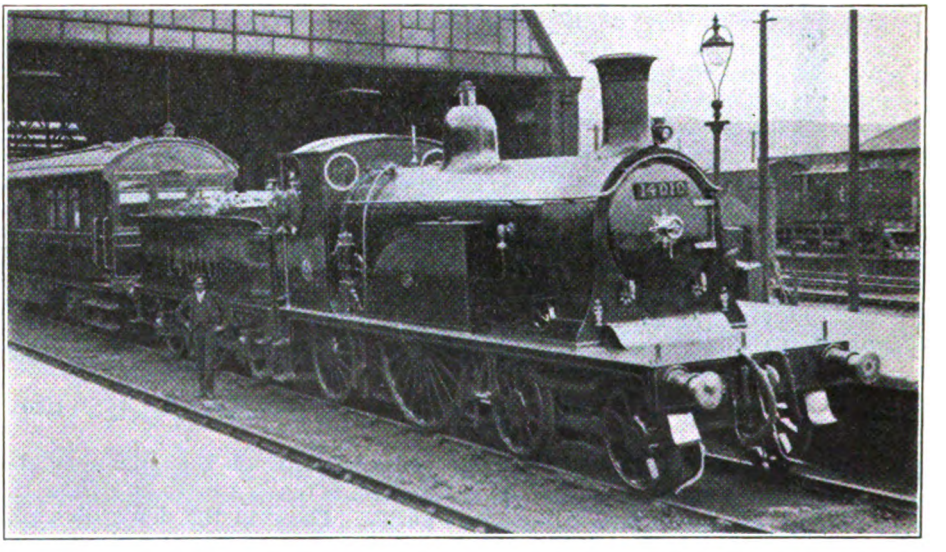

Photo.] [*H. Gordon Tidey.*

L.M.S. (CALEDONIAN) INSPECTION 4-2-2 LOCOMOTIVE No. 14010 (OLD No. 123) AT PERTH, WITH SALOON ATTACHED.

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TRAIN AT DALKEITH STATION.

"Waverley" Route Branches (Northern Section), L.N.E.R.

By G. E. LANE.

(Photographs by J. F. Gairns, except as noted.)

ALTHOUGH to some extent overshadowed by the main East Coast line via Berwick, the "Waverley" route of the late North British Railway still ranks as an important section of the L.N.E.R., not only because of the through services operated thereover (now mainly in conjunction with the L.M.S.R.), but also in view of the considerable volume of traffic which it carries on its own account. Further, quite a number of branch and other routes are associated with it, so that its northern section, especially that located within about twenty miles of Edinburgh, is a very busy area for goods and mineral traffic, although passenger traffic may appear to be a secondary matter. Even this is not altogether a correct statement, in that, while passenger trains may not be so numerous as in other recognised busy areas, they are by no means few, and at the periods of business travel, and to meet the needs of tourists and country-holiday-makers, a considerable volume of traffic is dealt with all the year round.

There is, too, always a large amount of coal traffic moving, in that these lines serve an important section of the Lothian coal field, while there are many local industries (in addition to agriculture and cattle and sheep-raising), particularly paper, for the manufacture of which the valley of the Esk is a great centre. Further south, and beyond the coal area, the lines concerned carry mainly agricultural and cattle traffic on the goods side, with a fair proportion of through coal trains, while many sections serve districts which involve a fair amount of ordinary passenger traffic, as well as giving access to districts, such as the "Scott country," which draw many visitors, not to mention several popular hill and angling resorts and the large extent of beautiful hill and wooded country passed through by so many of the routes concerned.

While a detailed study of the numerous

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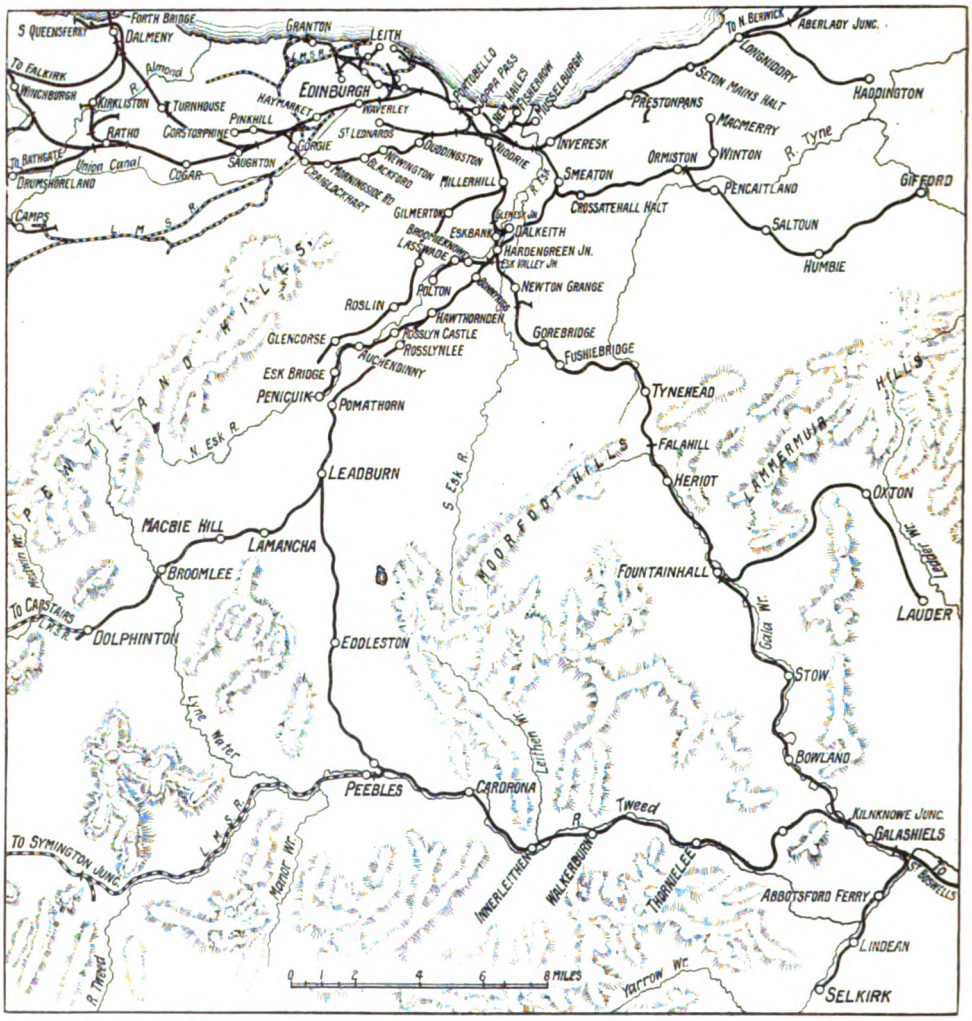
branches associated with the "Waverley" route affords far too much material for a single article, it may be pointed out that they may generally be associated in three groups, with several minor ones. The first, commencing at the northern end, includes the Dalkeith, Glencorse, Polton, Penicuik, Peebles and Galashiels, Dolphinton and Lauder branches, to which it is convenient to add the Selkirk line. The second, the St. Boswell's group, includes the line across to Reston Junction and Berwick via Duns, and the Jedburgh and Kelso branches, the last-mentioned forming practically a continuation of the late North Eastern route from Kelso via Coldstream to Tweedmouth and Berwick. The third includes the Border Counties group covering the line from Hexham to Riccarton Junction, with the branches from Reedsmouth to Morpeth, and the Rothbury line. Both of these groups associate, directly or indirectly, the Berwick and "Waverley" main lines. Remaining sections are the Langholm and Gretna branches, together with the Silloth line.



MAP OF L.N.E.R. LINES ASSOCIATED WITH WAVERLEY ROUTE FROM EDINBURGH TO GALASHIELS.

All these sections include many features of interest, as does the "Waverley" main line itself, but for the present only the "northern" group, between Edinburgh

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and Galashiels, but including the Selkirk branch, is considered, though attention will be given to the others at a later date. For completeness, however, reference is also included to the actual "Waverley" route as between Edinburgh and Galashiels.

The earliest part of the "Waverley" route ranks as one of the very first railways in Scotland, the old Edinburgh and Dalkeith Railway, incorporated in 1826 and partially opened in 1831. This was, of course, a horse-operated line, possessing several interesting characteristics, including a reputation for safety which caused it to be called the "Innocent" railway. Actually, only a small part is now associated with the "Waverley" route of to-day, in that its Edinburgh section now forms the comparatively unimportant St. Leonard's branch, while it reached Dalkeith by looping towards Musselburgh, so that a section is incorporated in the Gifford branch as far as Smeaton Junction, continuing more or less as the present goods line south to Hardengreen Junction. This line was, however, the beginning, and no doubt the fact that the original North British Railway took it over, in connection with its project for the Edinburgh and Berwick line, gave the first start to suggestions for lines towards Galashiels and Hawick, though even in 1820 there had been suggestions for a line from Dalkeith to St. Boswell's.

The first step towards the building up of the "Waverley" route was the construction of a direct line from Niddrie to Dalhousie, opened in 1847. A month later Fushiebridge was reached, and Bowland on August 4, 1848. On March 2, 1849, St. Boswell's became the terminus, and in October of the same year, Hawick. The main line was opened throughout to Carlisle in 1862. The branch from Hardengreen Junction to Peebles was opened in 1855, and the Galashiels-Selkirk line in 1856, though it was not until 1866 that the Peebles line was extended to Kilnknowe Junction, Galashiels. The Glencorse branch from Millerhill to Roslin was opened July 23, 1874, and from Roslin to Glencorse July 2, 1877; the Polton branch from Esk Valley Junction in May, 1867; the Penicuik line from Hawthornden in September, 1872; the Leadburn-Dolphinton branch in July, 1864; and the Lauder Light Railway from Fountainhall in July, 1901.

Several of these lines were promoted as independent companies, but all were eventually absorbed into the North British system, and so come into the L.N.E.R. of to-day. As, however, this article is mainly descriptive there is no need to deal further with historical aspects in detail. In that most of the train services are operated to or from Edinburgh, the through trains combining with those of the Berwick route and associated branches to provide a good proportion of the local facilities east and south of Edinburgh, it will be convenient to consider them "as they arise" in the course of a journey southwards.

As far as Portobello East Junction, "Waverley" and Berwick direction trains all take the same route, except that, in either case they can go direct from Abbeyhill Junction to Piershill Junction or be routed round the Abbeyhill and Piershill loop, to call at one or both of those stations, as is done by trains of a local or stopping character. There are two tunnels under Calton Hill, as described in the article on Waverley station elsewhere in this issue, and trains routed either way can use either the north or the south tunnel, transferring as required at Abbeyhill Junction. The loop gives access to that peculiar group of lines, connected and inter-connected in all directions with the Leith (Central), Leith (North) and Granton routes, later interwoven also with L.M.S. lines and the connections to and from Scotland Street goods depot, but eastbound trains soon return to the direct main line just beyond Piershill station. Each route is two-track only, but neither is particularly interesting, in that the district traversed is obtrusively industrial, except that direct trains pass St. Margaret's engine sheds and repair shops.

After rejoining, there are four tracks past Craigentinny carriage sidings, but at the point where the coastal line from South Leith (goods only) comes in they re-arrange so that the up and down "slow" lines are in the centre (to embrace the island platform at Portobello), with the "fast" lines outside. On the north side are separate goods lines, and these connect with extensive sidings, which give

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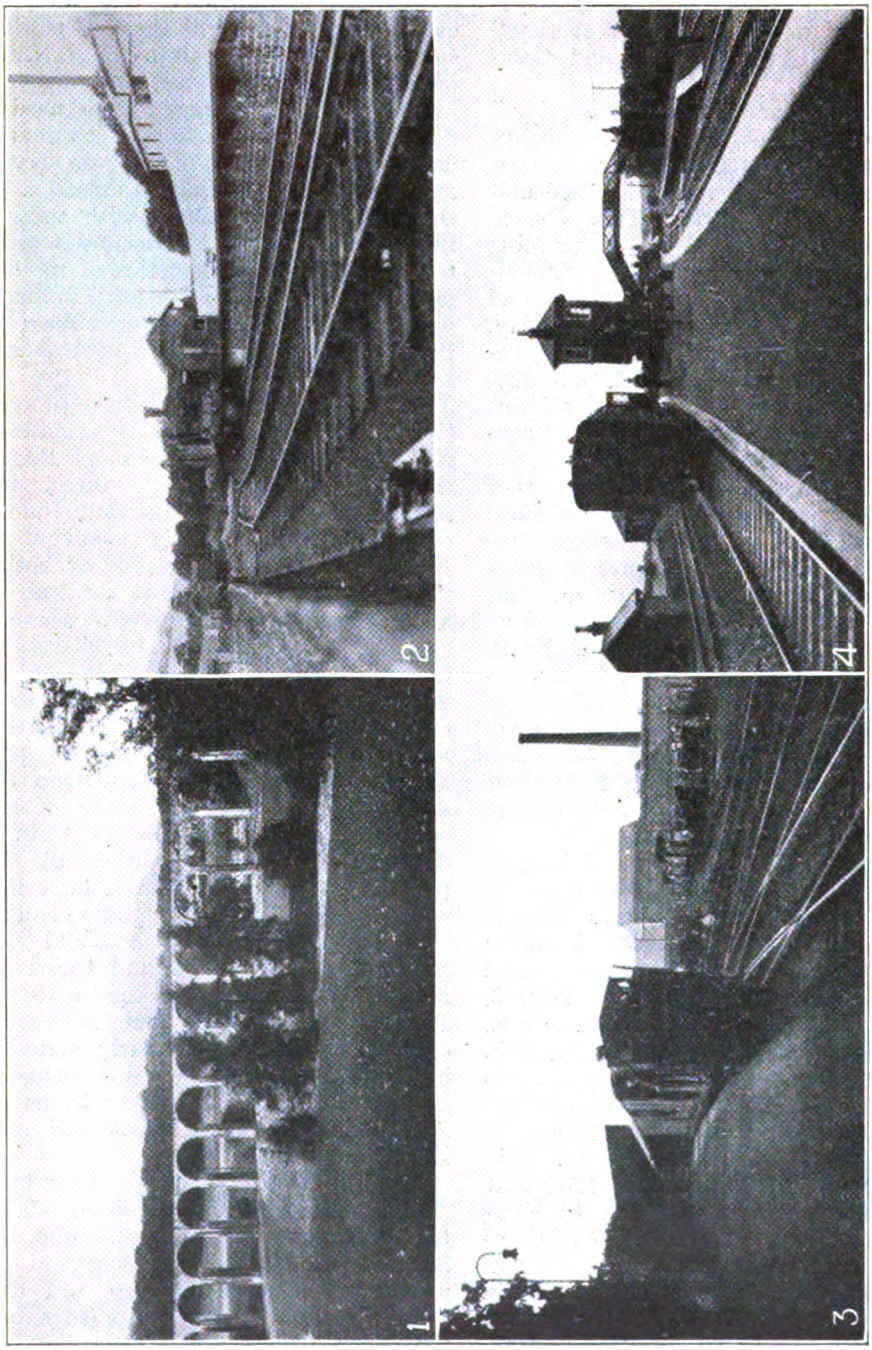

1. GLENCORSE VIADUCT.
2. DOLPHINTON STATION, L.N.E.R.
3. SELKIRK STATION.
4. LEADBURN JUNCTION.

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Portobello anything but the "pleasant seaside resort and residential" character which actually belongs to it.

Beyond the station, at Portobello East Junction, the "Waverley" route leaves Berwick trains to pursue their coastal course and turns southwards towards Niddrie North Junction. Here there is a triangular connection with the Edinburgh and South Side or "Circle" line, the connection for which comes in at Niddrie South Junction, enabling through goods and other trains routed over the South Side line from the north and west to reach the "Waverley" route without touching Waverley station. We then pass under a connection for the "Circle" route at Niddrie West Junction direct across to the Berwick line near New Hailes, giving trains in that direction similar user of the South Side route.

By this time "concentrated industrialism" has given place to open country, except for two or three colliery premises in sight, particularly close to the Niddrie junctions. At the South Junction there used to be a station, but that has been closed for many years and a part of one of the platforms only remains, so that Millerhill is actually the first station after leaving Portobello. This ranks as a junction, as just beyond it the Glencorse line leaves on the down side, but is actually an ordinary roadside station, with a bay on the up side, serving a residential district. For the next mile there is nothing of special account, except that the grounds of Dalkeith House are passed, until at Glenesk Junction the Dalkeith branch diverges on the up side. At the actual junction there is a section of platform, though there is no station, while the branch is only half a mile in length. This half-mile is, however, a rather pretty one, and includes a viaduct over the river Esk. The station, too, is a neat one, with its single platform adorned with flowers and its walls neatly painted, the work, it is understood, of a former stationmaster maintained by his successors. It is terminal, with goods yard alongside, and is not far from the centre of the fair-sized and comparatively busy town of Dalkeith. There are not many passenger trains, however, the first up being the 12.20 p.m., from Edinburgh and the first down the 1.21 p.m. back, but this is explained by the close contiguity of Eskbank station on the main line, which is, in fact, and correctly, named "Eskbank and Dalkeith." Here there is quite a good service, as trains for several destinations are available.

Although we have passed Millerhill, the Glencorse branch may be briefly described here, before commencing the routes concerned at Eskbank. The Glencorse line for the first few miles gets well away from the other routes to be considered, but beyond Loanhead comes in again within about half a mile of the terminus of the Polton branch, and from Roslin becomes a near neighbour of the Penicuik line which, itself, almost parallels the Peebles line for most of its length.

The Glencorse line is single track beyond Millerhill and has some steep grades. Through Gilmerton the country is agricultural, but the two miles onwards to Loanhead include three colliery connections. At Loanhead there are extensive coal sidings, and beyond still another colliery connection. Roslin is a fair-sized place, with Rosslyn Castle and Rosslynlee stations (note the different spelling), respectively, on the Penicuik and Peebles lines not far away. Here there is an engine shed and turntable, though no trains terminate here. Roslin Colliery has a connecting line a short distance past the station.

Despite, however, the frequent indications of colliery activities and the coal sidings, the route is quite pretty and beyond Roslin particularly so. When nearing Glencorse a picturesque valley is crossed by a fairly high viaduct of 16 spans. The terminus is an ordinary country station, largely of importance in that it is adjacent to Glencorse Barracks. The line continues for another quarter of a mile to give access to Eastfield collieries. Like several other branches, Glencorse has only four or five daily services, but the trains suit the considerable numbers of residential passengers who travel to and from Edinburgh daily, besides which the adjacency of stations on other lines means that in several cases there are alternative facilities.

Eskbank, which now calls for attention, is an ordinary two-platformed suburban station, serving its own residential district and the adjacent town of Dalkeith, as already explained. South of the station, however, is quite a busy place, with a big

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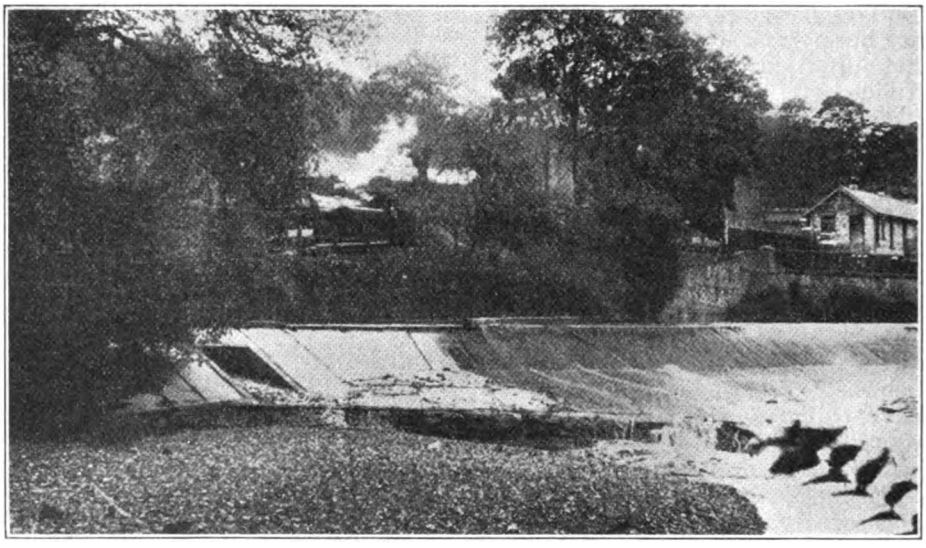
goods yard on the up side and smaller sidings on the down side, associated with Hardengreen and Esk Valley junctions. The main sidings constitute a busy marshalling centre, in that four traffic routes —from and to Polton, Penicuik, Peebles and the main line—are here brought into association, while a fifth comes in from the north-east in the shape of a goods and mineral branch from Smeaton Junction, on the Gifford line, and thence from the Berwick main line at Monktonhall Junction.

Polton, Peebles and Penicuik trains all leave the main line at Hardengreen Junction, and between the two routes are further sidings. The Polton line leaves the Peebles line at Esk Valley Junction, a bare half-mile beyond Hardengreen, and then curves away to serve the area between the Glencourse and Penicuik lines. It is only about two miles in length, with two intermediate stations, Broomieknowe and Lasswade, together with a colliery siding near its termination, but it serves the paper industry of the Esk Valley, as well as carrying its quantum of the Lothian coal traffic. It is, of course, single track, and both the intermediate stations have only a single platform, but the route as a whole is fairly busy, and is distinctly pretty. Between Broomieknowe and Lasswade there is a short tunnel, and the concluding mile is made in company with the river Esk, involving a viaduct and a bridge, views of broken water and well-wooded bank. The terminus is, indeed, right alongside the river, above a weir. A paper mill alongside the station has its own siding connection, while there are extensive lines to serve mills beyond the station, railway, factories and sidings being all crowded together around the river. The water of the Esk is regarded as peculiarly suited to the needs of the paper industry, and this accounts for the paper mills served by the Polton branch, though this is even more the case with the Penicuik line.



TRAIN AT POLTON, AS SEEN ACROSS WEIR, RIVER NORTH ESK.

Returning to Esk Valley Junction, there is little of special interest on the Peebles line through Bonnyrigg and Hawthronden stations, and this brings us to the Penicuik line, perhaps the most interesting of all these subsidiary branches. The Penicuik line becomes single track as soon as it leaves the Peebles route, but parallels it for some distance, though on a lower level, while the passenger looks down on the up side upon a wooded valley for the first mile. Rosslyn Castle is a rather pretty station, with gardens, rockery and other embellishments. Beyond, gunpowder mills are passed, until, on the way to Auchendinny, the river Esk joins company. Not much of it is to be

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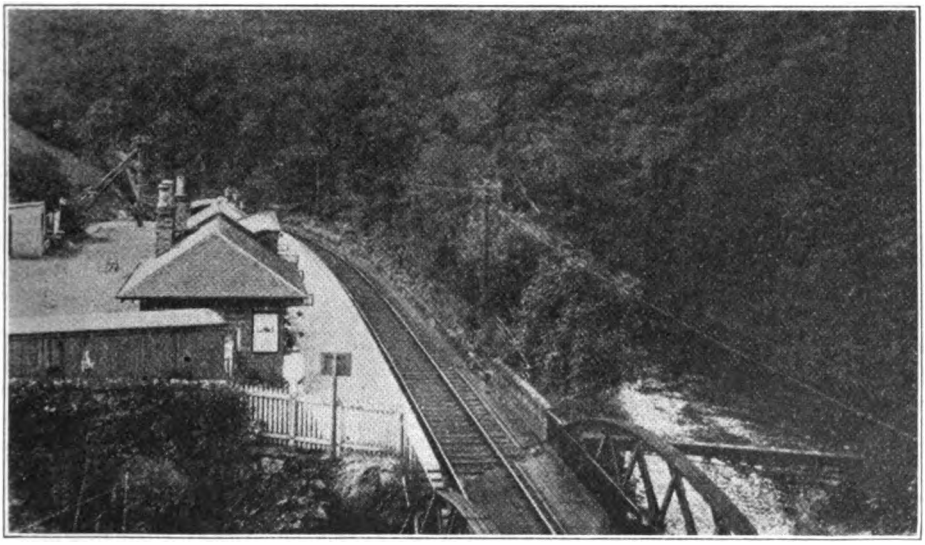
seen, however, until a covered way, with side openings here and there, has been traversed. Afterwards, however, the association of rail and river involves many attractive views until, after crossing a viaduct necessitated by the windings of the river, a short tunnel is passed through. Here the river makes a loop but comes in again so that trains leaving the tunnel cross it immediately by a bowstring girder bridge at the end of Auchendinny station. This is picturesquely situated, the river turning directly alongside, and the combination of the neat little station, the broken water of the river and the wooded background make quite a pretty view, as will be gathered from the photograph reproduced.



A PICTURESQUE LOCATION—AUCHENDINNY, PENICUIK BRANCH.

Onwards to Eskbridge the railway continues in close association with the river, with one or two siding connections, while the concluding three-quarters of a mile provide a mixture of picturesque river scenery, including broken water, weirs, and paper-mill premises and activities. Penicuik is a fair-sized town, and its single passenger platform, with engine shed adjacent, compares strikingly with the extensive goods yard and warehouse accommodation provided. Some of the paper mills have their own railways and use locomotive power.

This concludes the series of subsidiary branches, so that the Peebles line can now be followed from Hawthornden. Like the Penicuik line, it now becomes single track, but whereas that branch descends, Peebles trains have several miles of hard climbing yet before them. Passing a branch to Whitehill colliery, practically the last sign of coal activity requiring mention, Rosslynlee is the first station, and on the two and a-half mile run thence to Pomathorn one sees occasionally the factory chimneys and other industrial associations of the Penicuik line, which is, as already indicated, a close neighbour, though down in the valley. It is, indeed, a bare half mile walk from Pomathorn station to Penicuik, though the former has none of the industrial associations of the latter.

By this time, indeed, the lowland hills are coming into sight, and thenceforward agriculture, cattle-raising, moorland scenery and undulating and picturesque country become the rule, until we reach Galashiels. Leadburn is the junction for the Dolphinton branch. Here there is a bay on the down side used by branch trains, for the benefit of which a turntable is provided. The station is, of course, crossing, leading to single line toward Peebles as well as to Dolphinton. On the branch moorland country is traversed as

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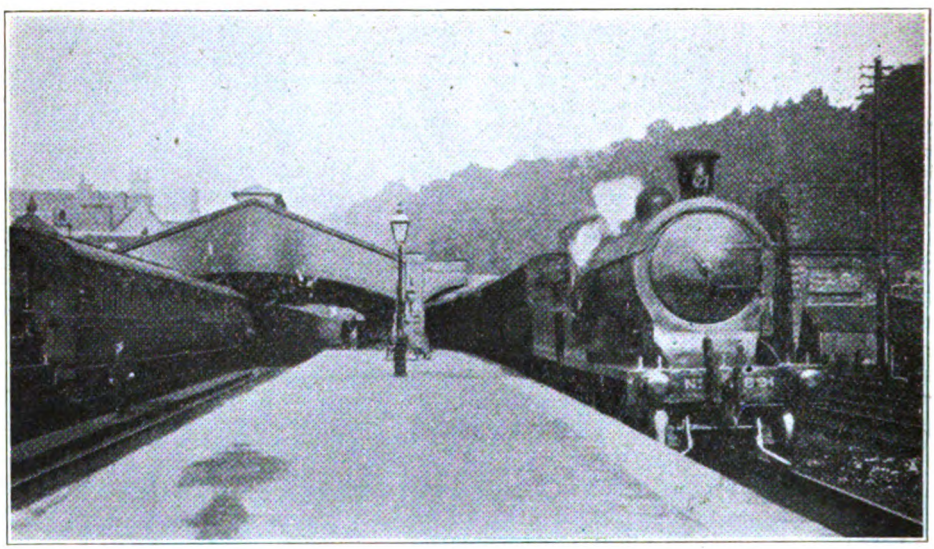
far as Lamancha station. Surroundings become prettier at Macbie Hill station, while just beyond Broomlee the Lyne Water is crossed. Moorland continues and the hills come closer, until, at Dolphinton, the branch comes to an end as a quiet country station serving a favourite hill resort, convenient for angling enthusiasts, and a centre for cattle, milk and agricultural traffic on a considerable scale. Behind the station a branch is put off extending under the road bridge to join up with the L.M.S., whose station is on the other side. From Leadburn the Peebles line continues across moorland country, but in frequent company with the river which it crosses and re-crosses. Here and there the river scenery is diversified by glimpses of red sandstone cliffs which, in conjunction with broken water and trees, combine to produce much interesting scenery.

The town of Peebles is of considerable size, but the L.N.E. station has a single platform only. It is, however, largely covered in with a neatly-designed glazed roof and is adorned by hanging flower baskets and other floral decorations here and there. The engine shed is located north of the station, near a timber yard, while the goods yard proper is to the south, adjacent to the connecting line into the L.M.S. station. Leaving the town there is much picturesque scenery, and in the immediate vicinity many attractive residences. For some distance the line continues alongside the public road, looking down thereon, and also into the valley of the river Tweed, which, leaving the railway to the north, soon comes in again, in that for some miles further rail and river are in close association. Near the gasworks branch there is a short tunnel.

In the neighbourhood of Cardrona station there are again many attractive views, and for some miles further the river is crossed and re-crossed by the railway. Innerleithen is a fairly busy place, there being several factories adjacent to the station, though, otherwise, the surroundings are picturesque. Just beyond the station the line crosses the river, and a somewhat unusual impression is obtained by the fact that much of the town, including one or two factories, is apparently built up on the hillside. Picturesque surroundings continue past Thornilee station, right among the hills until about two miles further on the railway, which has been climbing so as to look down upon the valley, turns northwards towards Clovenfords station, the whole of this section being amidst the lowland hills, some of which attain to considerable height. A loop is then made to reach the main line at Kilnknowe Junc-



TRAIN FROM EDINBURGH, VIA PEEBLES, AT GALASHIELS.

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tion, near which point the Gala Water (which for many miles has been in close company with the direct line to Galashiels) makes a loop, of which a good view, as also of the viaduct carrying the main line, is had from the Peebles line as the two routes come together.

Before continuing the route further we may now return, for the last time, to the northern part of the "Waverley" route, in order to deal with the section from Eskbank to Galashiels *via* Fountainhall. This is, of course, double track all the way, as is, indeed, the case throughout to Carlisle, traffic being much too heavy to permit of any section of the main line proper being single track. Just before reaching Newtongrange station, the River South Esk is crossed by a fairly long viaduct over the ravine through which it passes. Approaching Gorebridge station connection is made with the extensive sidings associated with the Lady Victoria Colliery. Gorebridge station is somewhat unusually constructed, in that the station offices are all on the down side at rail level, set back a little from the running tracks leading to the slope of the down platform, the up side being reached by a footbridge.

The next station, Fushiebridge, is three-quarters of a mile distant only. It is quite a pretty station, with rustic decorations and platform gardens. Adjacent is a small colliery, the last met with on this line. Approaching Tynehead station the railway joins company with a section of the River Tyne, and surroundings are distinctly picturesque, though to locomotive men travelling southwards the whole of this section involves hard climbing owing to the severity of the gradients which culminate at Falahill sidings. Here, the country is of moorland character, and Falahill is mainly of importance in that it forms the point to which assisting engines work, while its sidings enable goods trains to be disposed of while their engines are taking water preparatory to continuing the journey.

WAVERLEY ROUTE EXPRESS AT GALASHIELS.

Just beyond Falahill the Gala Water comes in from the Moorfoot Hills, and thereafter continues in close company with the railway, which crosses and recrosses its loops throughout the remainder of the journey to Galashiels. Fountainhall is the junction for the Lauder Light Railway, for whose trains a platform is provided on the up side. The writer was not able to travel over this branch, which is 10½ miles in length, and renders useful service to an agricultural district, though it has only three or four passenger trains and one goods train daily, two of the passenger trains being operated as "mixed."

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Beyond Stow station the river is crossed by a lattice girder bridge, and, just beyond, a short tunnel is traversed. Onwards to Kilnknowe Junction the close contiguity of the river and its many windings and picturesque surroundings, with the hills on either side, render this a pretty section. Just before reaching the junction the river is twice crossed by a viaduct, as already mentioned. Onwards to the town, however, there are growing signs of the industrial activities of Galashiels, a town at which even the principal expresses now call, although at one time there were a few non-stop trains between Edinburgh and Carlisle.

Galashiels station has an island platform on the up side, there being an overall roof covering the central portion of the main up and down platforms, with a veranda serving the outer face of the down island. Adjacent to the outside platform are several carriage sidings, useful in that Galashiels is a terminus for trains from both the main and Peebles routes, as also for Selkirk branch trains, while a few trains from Kelso and St. Boswell's work through to Galashiels to make connection with through trains. South of the station are the engine sheds, and, on the down side, extensive goods accommodation.

The Selkirk branch diverges at Selkirk Junction. It is, of course, single-line. Just beyond the junction it gives access to a low-level line leading to the gasworks, also serving a mill siding, and one to the Galashiels Electricity Works. At Abbotsford Ferry station the branch comes directly alongside Ettrick Water, which is here of considerable width, and is crossed by a ferry boat, operating in conjunction with an elevated guide wire, plying from a point immediately adjacent to the station. Continuing in company with Ettrick Water, much pretty scenery is involved in the mile and a-half run thence to Lindean station, though by this time the river is now on the down side.

The concluding stage includes siding connections with two or three factories, and the branch comes to an end at the little station of Selkirk, a single-platform structure with considerable goods accommodation alongside. The town of Selkirk has much historic interest, and, although from the station does not appear very inviting, is much visited by tourists and others.

EXTERIOR OF GALASHIELS STATION.

(By courtesy of Benn & Cronin, Ltd., one of whose Indicators is shown.)

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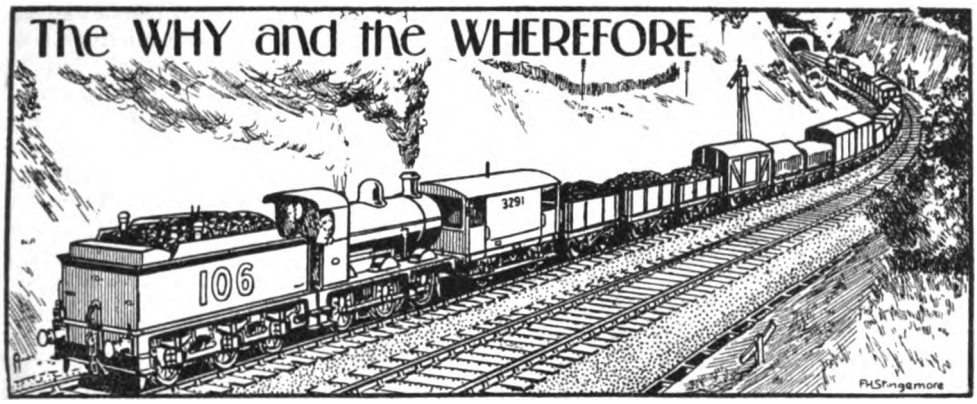

RAILWAY MAGAZINE *readers desiring information should mark envelopes " Query " in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning " British Locomotive Practice and Performance " may be addressed to Mr. Cecil J. Allen, c/o* RAILWAY MAGAZINE, 33, *Tothill Street, Westminster, London, S.W.*1. *No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or " grouping," the pages of the " Railway Year Book "* (5*s. net*) *should be consulted. The twenty-eighth Annual Edition* (1925) *of this standard railway reference work is now published. All previous Editions are out of print.*

Southern Railway Electric Stock.

Were the Crystal Palace sets made up with motor-cars at each end, it would mean that two out of three vehicles would be motor-equipped. Presumably, it was thought better to concentrate the motive power on the centre vehicle rather than to have both the first and third vehicles motor-equipped or to concentrate all the motive power on the end vehicle of the three. In the case of the Coulsdon and Sutton sets the same policy of concentrating all motive power on the centre vehicle is adopted. As the electrical system used on the South Western and S.E. & C. sections differs, other considerations are involved. We have several times explained that the letters E.F.B. seen at various " Brighton " stations indicate the location of electric fouling bars, as a guide to drivers, so that if they are kept waiting they will stand at a place where their presence is indicated in the signal cabin.

[Reply to J. H. COGHLAN.]

Projected Tube Railways.

Not only in the April, 1905, number, but also in various subsequent issues, incidental reference has been made to various projects for new tube railways. Some of these came before Parliament, but the majority died a natural death, either because of the lack of financial support if and when an attempt was made to bring the scheme to fruition, or because it was found that ideas which read very nicely in print assume quite another complexion when realisation is considered on a practical basis. The only new tube railway at present under construction is the " Underground " extension from Clapham Common to Morden. The Walthamstow scheme has long since joined the list of " lines that might have been." We have no information as to a projected light railway to Harefield, Middlesex.

[Reply to " MARYLEBONE."]

Southern Railway Matters.

You can ascertain distances from Victoria to stations on the Chatham main line, with sufficient exactitude for ordinary purposes, from the pages of *Bradshaw*. Exact distances are, however, usually given by Mr. Allen when he deals with runs on a particular route. We cannot answer questions as to numbers of engines of a particular class or give dimensions unless there is any special reason therefor. The L.S.W. section 0-4-4 tank engines were fully described in our pages when they came out, but that is a good many years

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ago now. We have already dealt with those of the "King Arthur" class locomotives which rank as rebuilds, though, speaking generally, we understand that some of them, at least, are replacements, and not the original engines rebuilt.

[Reply to "STANDARDISER."]

Train Broken in Two.

If all rules are correctly obeyed, it should not be possible for an accident to occur to a goods train breaking in two, unless the breakaway portion runs back and collides with a following train or does damage in other ways. The divided train should be noted at once, and if the tail lamps are correctly observed, and the guard in the rear van takes correct action, it should not be possible for another train to come into collision with the vehicles, unless, as already pointed out, they run back and so come into collision with a train in the section behind. Otherwise, the following train would be protected by the fact that the "section clear" could not be given, for the reason that the divided train would not have passed through the section as a complete unit.

[Reply to "KATCOMBA."]

Old G.C. Locomotives.

Mr. A. H. Tolley, writing from Mansfield, reports that there are several old G.C. outside crank 0-6-0 goods engines still in service, and that he has seen also one or two early 4-4-0 outside crank locomotives. These were all on the duplicate list, though one of them is now No. 6466. This was noted recently at Annesley sidings, near Nottingham. Prior to grouping, the 0-6-0's referred to were numbered 549 to 560, inclusive, all of which have been noted on the old L.D. & E.C. line at various times. Recently, No. 555, now No. 5555, was seen at Heath, while No. 5549 was noted at Warsop Colliery Junction on a ballast train.

[Further reply to J. JACKSON.]

Early East Coast Route.

Through trains between King's Cross and Edinburgh commenced in September, 1850, and ran *via* the "Loop line" from Peterborough, through Spalding, Boston and Lincoln, to Sykes Junction, Saxilby, thence over the Manchester, Sheffield and Lincolnshire Railway to Retford, where the Great Northern line to Doncaster was utilised. We cannot conveniently refer to a time-table of the period, but no narrow-gauge trains at that time ran more than 30 or 40 miles without stopping; it may therefore be assumed that the fast trains stopped at all the places mentioned above except, possibly, Saxilby. The trains took 12 hours between King's Cross and Edinburgh.

[Reply to R. T. NINNIS.]

Locomotive Turns.

Although at times, and occasionally in an article justifying such reference, mention has been made of the duties to which engines are allocated, we have not published any articles describing in detail the locomotive turns of any leading railway. Indeed, any attempt to do this would mean occupying space for a purpose which would be appreciated by only a section of our readers, while, as changes are continually being made, it would follow that by the time any instalment were completed it would almost certainly be inaccurate in some degree. In fact, we cannot see that any good purpose would be served by articles of this kind.

[Reply to "FLYING FOX."]

"Experiment" Class Locomotives, L.M.S.R.

We understand that some of the "Experiments" are to be rebuilt and superheated. There may be other factors explaining why some engines of the class have been scrapped. It is by no means unusual for a few engines of a class to be scrapped, apparently prematurely, and for other and older engines to be kept in service, though, as a rule, there are special factors in explanation of the former, while, in regard to the latter, the engines may be retained as specially suitable for a particular section of traffic. Your further remarks are noted, and to some extent we sympathise with them.

[Reply to C. C. HUNT.]

S.R. Locomotive Restrictions.

The principal reason why the bigger locomotives cannot work over every part of the S.E. & C. section is that there are many bridges which have yet to receive strengthening attention, while, here and there, other restrictions, such as those

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imposed by tunnels and bridges, also apply. The Southern Railway is gradually improving the situation in these respects, but until the work is completed, involving expenditure which necessarily must extend over many years, there will continue to be sections where the bigger engines cannot be used. [Reply to J. G. STURT.]

Straight Line Avoiding King's Lynn Terminus.

Such a line has probably been considered, but we are unaware that it has ever seriously been contemplated. The Royal trains to and from Wolferton (for Sandringham) are relatively so few as not to affect the question. There are much more important places than Hunstanton that can only be reached by reversing *en route*. We have no information as to whether Royal Specials have worked over the Midland and Great Northern Joint Railway. [Reply to "ALLEYNIAN."]

Solway Viaduct.

The viaduct across Solway Firth still exists, but as it is in an unsafe condition it has not been used for some years. Hence, on maps aiming at strict correctness, it is in order that the line should still be shown, although on maps for public information, as the communication is not now available, it is equally in order that the connection should not be shown. The comparatively small amount of traffic passing explains why reconstruction and strengthening have not been undertaken.

[Reply to "ST. PANCRAS."]

Joint Railway Operation.

The allocation of responsibility between two companies concerned in a joint line, such as that between Hereford and Shrewsbury, is a matter of arrangement between the respective companies, and may be varied from time to time. For details of joint railways, and for maps clearly indicating the difference between joint ownerships and running power arrangements, please see the special maps which constitute a feature of the *Railway Year Book*.

[Reply to SAN FRANCISCO.]

Plymouth and Dartmoor Railway.

We think you are right in your view that the permanent way of the parts of this railway not previously taken over by the London and South Western and Great Western Railways would have been useless abroad for railway purposes in the war zone. As a result of the railway grouping, the Plymouth and Dartmoor Railway has been dissolved. We will bear in mind your suggestion for an article on this railway. [Reply to H. L. LEWIS.]

Errata.

We are obliged for your correction of slight errors in locomotive descriptions in the October issue. The working pressure of the New South Wales Government 4-6-0 engine (page 325), should, of course, read 180 lb. per square inch, and not per square foot; and the tractive effort of the large P.L.M. 4-8-2 engine should be 47,385 lb., and not 47·385 lb. We note the locomotive matters to which you draw attention. [Reply to A. BILES.]

L.N.E.R. Locomotive Developments.

We have no information as to the locomotive developments you mention, but may point out that experimental changes are frequently made for the purpose of investigation, and it is possibly one of these that has come under your notice. Presumably, the *Railway Service Journal*, published by the Gray's Inn Press Limited, 25, Euston Road, London, N.W. 1, is the publication as to which you ask.

[Reply to FRED INGHAM.]

Southwold Railway.

Particulars given in the *Railway Year Book* show that this line, of 3-ft. gauge, owns four locomotives, six coaching vehicles and 38 goods vehicles. We had already noticed that "distant" signals on the G.E. section of the L.N.E.R. are being painted yellow; also that some of the "Claud Hamilton" 4-4-0 engines have been fitted with Ross "pop" safety valves. [Reply to W. T. WARD.]

The G.W.R. in the North.

Reference to the ownership maps published in the *Railway Year Book* shows that the most northerly points reached by the G.W.R., in both cases through lines jointly owned, are Birkenhead and Warrington. Your notes as to locomotives observed are appreciated.

[Reply to A. C. TODD.]

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G.C. "Director" v. Midland Compound.

In our answer, wherein we stated that there is no material difference between the performance of these two types, we referred more particularly to loads and times; in the matter of coal consumption the Midland compound is without much doubt the more economical of the two types.

[Reply to W. T. THORNEWELL.]

Derelict Engines near Chester.

The engines you saw were probably the large stock of R.O.D. engines of the Great Central 2-8-0 type, located at Sandycroft, of which (despite the large purchases of the L. & N.E. and G.W. Railways) disposal has not yet been effected.

[Reply to D. J. W.]

Newmarket and Chesterford Railway.

We have several times lately replied to enquiries as to trains of a disused railway in the Newmarket and Cambridge district, presumably all relating to the proposed and partially constructed Newmarket and Chesterford Railway.

[Reply to E. C. GRAHAM.]

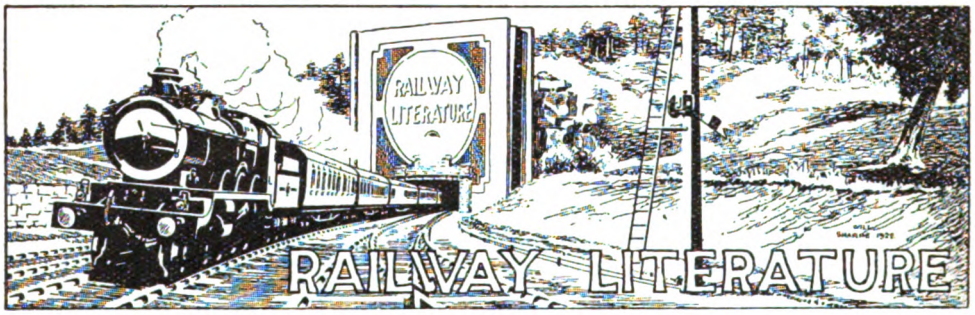
Electric Stock at Streatham Hill.

Vehicles intended for the S.E. and C. section are receiving their final fittings and other attention in preparation for service in due course. They must, of course, be brought and removed by steam locomotives. [Reply to P. S. EVETTS.]

Named Locomotives, S.R.

No information is yet available as to the extent to which present S.E. and C. locomotives will be named. We have already given the names which will be borne by new 4-4-0's under construction for this section.

[Reply to A. R. MORDAUNT.]



THE WONDER BOOK OF THEN AND NOW. [Published by Ward, Lock and Co. Ltd. Price 6s. net.]

This is the latest addition to the well-known "Wonder Book" series of volumes published by Messrs. Ward, Lock and Co. Ltd., under the general editorship of Mr. Harry Golding. As will be gathered from its title, the general idea is to contrast early days in various connections with present conditions, so that only to a limited extent must this be ranked as a railway book. The double page frontispiece is, however, a splendid reproduction in colour of the famous old pictures showing first and second-class passenger, and goods and cattle trains on the Liverpool and Manchester Railway in 1831. The title page bears an illustration of the L.N.E.R. "Garratt" locomotive, while "Railways—Then and Now," is the first of the 34 articles which the volume includes. Twenty-one pages are given to this article, and among the illustrations are views taken on the occasion of the Railway Centenary, and reproductions of old prints, including several relatively little known. A number of famous early locomotives are also shown, in contrast with outstanding examples of modern practice. This article, it may be mentioned, bears the signature of Mr. J. F. Gairns, Editor of THE RAILWAY MAGAZINE. Other articles included in the volume deal with omnibus and tramway development, ocean travel, the story of the cycle, and a wide variety of subjects as permitted by the comprehensive title. There are, altogether, twelve colour plates, including the double-page frontispiece. Mention may also be made of a colour view contrasting *Locomotion*, 1825, with a modern "Pacific" locomotive.

This volume has the same outstanding characteristics as the other volumes of the "Wonder Book" series, being beautifully printed in easily readable type, and with a very large number of illustrations, including, in all articles, several which are by no means well-known and the obtaining of which indicates that considerable research has been made.

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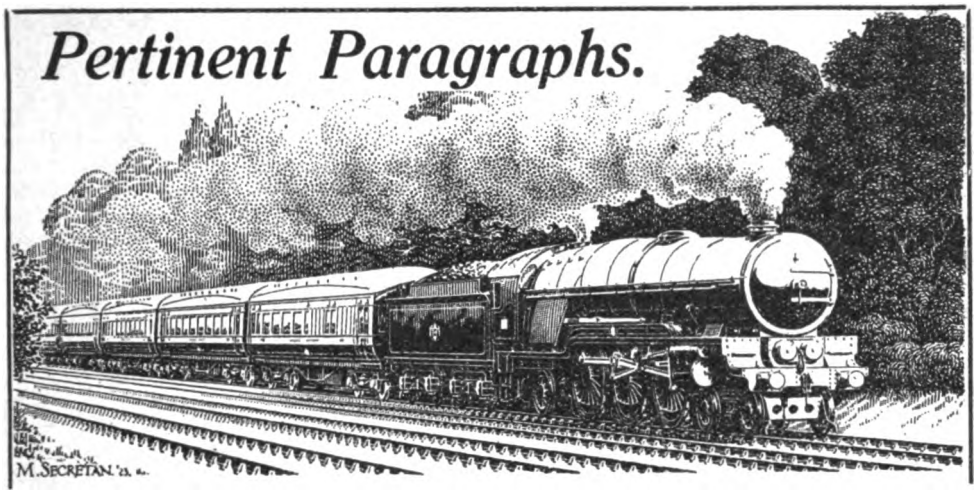
Pertinent Paragraphs.



Railway Matters in the House of Lords.

On November 26, Lord Monkswell called the attention of the Government "to the fact that the railways since their amalgamation had failed to remove certain serious defects affecting the convenience and safety of the public," and asked the Government to "urge on the railways the immediate adoption of the following improvements: (1) The acceleration of express trains; (2) the issue to engine drivers of precise instructions about the making up of lost time; (3) the adoption of mechanical safeguards against excessive speed on sharp curves and other danger points; (4) the full and complete investigation of improved rail joints; (5) the adoption of third-class sleeping carriages; and to move for papers."

Lord Monkswell said that, with the exception of the institution of a number of improved cross-country services, public hopes of improvements following on amalgamation still awaited fulfilment. Railway administration was so conservative that the introduction of change was extremely hard. He also suggested that at no time had railway managements made the least attempt to run their trains as fast as the rolling stock and roads at their disposal rendered feasible, and claimed that the history of railway speeds in this country had been a long series of agreements between railway companies for withholding from the public speeds which they could easily have offered. Roads, rolling-stock, signals and brakes were adequate for a large increase of speed. Higher speed was largely a question of faster running uphill. The approximate cost of the power required to increase the speed of an average train from 55 to 70 miles an hour was about 1½d. per mile for coal, and another 1½d. for the increased maintenance of boilers. In this connection he commended the French four-cylinder locomotive.

He also referred to the question of instructions as to making up time.

Speakers in the discussion included Lord Montagu of Beaulieu, Lord Banbury of Southam, Lord Knaresborough, Lord Sandhurst, Lord Emmott, Viscount Churchill and Viscount Peel. It cannot, however, be said that Lord Monkswell's suggestions and comments received much sympathy.

Junctions, Stations and Speeds.

In the discussion on Lord Monkswell's speech in the House of Lords, some interesting figures were quoted by Lord Montagu of Beaulieu with regard to the number of junctions and stations over similar distances on English and French lines to show that greater difficulties were experienced here in connection with the running of express trains at high speeds. Paris and Calais (Northern Railway of France) are 184 miles apart and between them there are 46 stations and nine junctions, while between Euston and Warrington (L.M.S.) practically the same distance—182¼ miles—there are 59 stations and 52 junctions. Between Paris and Calais the fastest trains take 195 minutes for the journey, a speed of 56½ miles per hour, though some of his statements as to Continental train running, loads, distances, times, gradients and traffic hindrances seem to be open to question. Lord Montagu also compared a run on the P.L.M. from Paris to Laroche, a distance of 96¼ miles. For this journey, he stated, the non-stop express took from 2 hours 7 minutes to 2 hours 20 minutes, averages of 45 and 41 miles per hour respectively, and that is over a comparatively easy route up the valley of

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the Seine. In his opinion this performance compared very badly with many similar runs in this country. As showing the difficulties of operation in the vicinity of large terminals, Lord Montagu also added the interesting information that within 15 miles of the London termini of the Southern Railway there were 71 junctions and 222 stations.

Edinburgh–Granton Line, L.N.E.R.

We are indebted to Major A. R. Munro for the following remarks concerning this line :—

The intimation by the authorities of the London & North Eastern Railway Company that Granton and Trinity stations were to be closed to passenger traffic from November 2 is of more than local interest. This line was constructed for the conveyance to Granton-on-Forth of passengers to Fife and the north by the North British Railway before the building of the Forth Bridge. From Granton they were taken by steam ferry to Burntisland, where they rejoined the train ; and, if they wished to go beyond Dundee, they had to cross another ferry there, till the building and re-building of the Tay Bridge. Since the opening of the two great bridges, the importance of Granton has, of course, diminished largely, as also the traffic by railway ; but until the end of October there has been a service of eight trains each way, six of which connected with ferry sailings from the pier on which Granton station is situated. The ferry is to continue, but only goods and mineral traffic will be handled at the station, while Trinity station is to be closed altogether.

It is officially stated that the traffic was not sufficient to make the branch pay its way, and it is understood that this is due mainly to tramway competition. The ferry caters to some extent for motorists conveying their cars to Fife ; but they, of course, transport themselves by road to the pier, and do not help the railway traffic returns. Granton is also somewhat important as a fishing port, and no doubt this traffic will continue. Trinity station is situated in a purely residential suburb of that name, and would not have any non-passenger traffic of value. The line from Waverley station to North Leith, which branches off from the Granton line beyond Leith Walk station, will continue to function as usual.

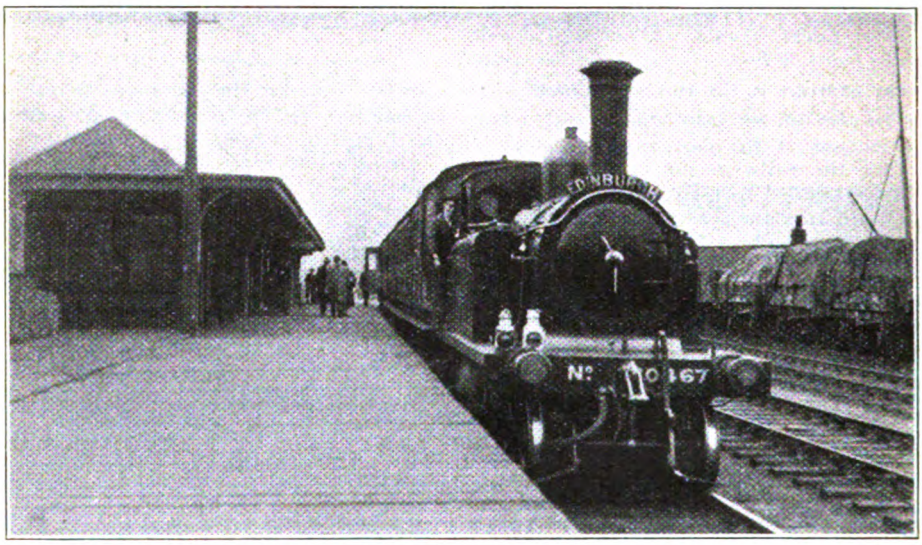

Photo.] **EDINBURGH TRAIN AT GRANTON.** [*J. F. Gairns.*
This service is now discontinued.

British Main-line Passenger Train Services.

On November 17 a lecture to Graduates and Students of the Institute of Transport was given by Mr. Cecil J. Allen, the chair being occupied by Mr. R. H. Selbie, C.B.E., General Manager, Metropolitan Railway. In introduction, Mr. Allen referred to the correspondence between Lord Monkswell and Sir Sam Fay originally published in *The Times*, and as to which reference has been made in our own pages, leading up to the advocacy of special fast trains to meet the requirements of the business community, with the suggestion that a system of express fares should be introduced for such trains. He emphasised the anomaly that fares

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are the same whether a passenger travels in a high-speed train, with all the refinements of modern travel, or in a semi-fast, or even stopping train without special facilities. In support of his claim that the high speeds in question were practicable, reference was made to many of Mr. Allen's own records of locomotive performance. Another point raised was the suggestion that first-class fares should be based on 50 per cent. above third-class, in which connection comparisons were made with conditions in Germany, Italy, France and the United States, with particular reference to fares and class arrangements.

The chairman, in proposing the vote of thanks to the lecturer, said that it would be interesting to have information on two points, namely—(*a*) comparative costs of running an express train running at 60 m.p.h. over a journey of 100 miles, and a slow train with, say, 20 stops; and (*b*) whether the public would be prepared to pay extra for luxury travel when so many methods of cheap travel, such as road motor services, were available. Regarding the first point, Mr. Selbie stated that his experience, chiefly in connection with electric trains, was that the cost of running a non-stop train was only one-third of that of a slow train with 15 stops.

An interesting discussion followed, during which the following points, among others, were raised: What liability, if any, would attach to the companies in the event of unpunctuality on trains for which supplemental charges had been made; the possibility of refunds being demanded where a supplemental charge return ticket had been used for return on an ordinary train; and, punctuality being the chief desideratum, whether accelerated running would prejudice this by rendering it more difficult to "make up time."

G.W. and L.M.S. Joint Lines.

MANY statements have been published in the general Press suggesting essential changes in regard to G.W. and L.M.S. Joint Lines, particularly the Chester and Birkenhead, Chester and Warrington, Shrewsbury and Hereford (including the Tenbury and Clee Hill branches), Shrewsbury and Wellington, Shrewsbury and Welshpool, and Shrewsbury and Minsterley lines. In view thereof, Sir Felix J. C. Pole, General Manager, G.W.R., recently sent a letter to Mr. J. L. McCarthy, of the Liverpool Chamber of Commerce, explaining the situation in the following terms:—

"The Press reports which have appeared to the effect that it is the intention of this company to withdraw their services from Liverpool and Birkenhead are absolutely untrue. The facts are that in connection with the pending retirement of the Joint Superintendent at Shrewsbury, the G.W.R. and L.M.S. Companies have decided to divide the supervision of the joint lines between them, thereby saving the cost of a separate joint superintendent's establishment. The public will not be affected in any way as a result of the altered arrangements, and you may be quite sure that the G.W.R. Company have no intention whatever of weakening their position in Liverpool, Birkenhead, Manchester and district."

We understand that the new arrangements will apply as from January 1 next.

The Highland Railway under the Grouping System.

IN THE RAILWAY MAGAZINE for January, 1922, there appeared an article under the above heading, the writer of which remarks in closing:—"It remains to be seen to what extent the traffic conditions and working methods of the Highland Railway will be changed when grouping is completed, and it will probably be some years before any great alterations become noticeable. . . . There should be every inducement for the group management to do all that is practicable to develop traffic between England and Southern Scotland, and the wonderfully attractive districts served by our Farthest North Railway." Commenting upon this Major A. R. Munro sends some observations as to the present situation: "Generally speaking, I would say that the L.M.S.R. has done a good deal to encourage long-distance traffic, especially to and from the Southern sections of that railway. . . . All long-distance trains on the northern, eastern and southern sections of the old Highland system now include restaurant cars for at least a portion of their runs, and this is an immense improvement on the old method of depending on procuring food baskets or cups of tea, &c., at station refreshment-rooms *en route*. Incidentally, this change has permitted a reduction of the time allowed at these stations for meals. To permit of free access to the cars while travelling, all of these trains are now composed of vestibuled stock, and this has necessitated the introduction of a good deal of plant from other lines of the group, for not many of the Highland coaches were vestibuled, although some of the later ones had side corridors in themselves. Many of these imported coaches have not yet been repainted in the Group colouring; so these trains display a very mixed colouring, including specimens of the old Midland and North British Joint Stock, London and North Western, Caledonian, Lancashire and Yorkshire, and even Furness railway stock. Another way in

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which these changes assist the timing of the trains is that tickets can now be collected *en route*, saving the time formerly allowed for this at stations, and reducing the station staffs required. The through trains are shorter and more numerous than formerly; for example, the old 3.50 p.m. up train from Inverness to Perth was last year represented by no less than five separate trains, leaving Inverness at 2.15 (*via* Forres), 3.20, 3.45, 4.15 and 4.35, and two of these continue to run through the winter. On the day when I passed through Inverness on my return journey, the four trains by the Carr Bridge route totalled over 850 tons tare weight (or over 900 load), giving an average of 225 tons total weight per train. One item of the load of the 3.45 train was an unusual one, being the Duke of Sutherland's private saloon conveying H.H. the Maharajah of Patiala and suite, who had been on a visit to His Grace at Dunrobin Castle.

"Turning next to the question of Locomotive Power, I saw one Glasgow and South Western goods engine at Perth, an ex-Caledonian at Blair Atholl, and a small 4-wheeled saddle tank of unknown origin on the Harbour Branch at Inverness; but otherwise the Highland locomotives seem to do their work unaided and without any recent additions, which is no easy task in view of the amount of heavy stock which they have now to pull regularly. The express passenger work between Perth and Inverness is carried out almost altogether by the 'Clan' and 'Castle' classes of 4-6-0 engines, piloted when and where necessary by a 0-6-4 tank or a "Small Ben"; while the principal trains north of Inverness are hauled by 'Castles,' 'Lochs' or 'Big Bens.'

"I was informed that one of the 'Clans' had been seen at Dingwall, and I saw one of the big superheated goods engines at Bonar Bridge (with its class number '5' on the side of the driver's cab); but these are, I believe, exceptional runnings. The Inverness and Keith, Inverness and Kyle of Lochalsh, and Inverness and Tain trains, all light-weights, are headed by a 'Small Ben' or one of the 1917-built 'Lochs.' The Highland engines have not worked through to Glasgow this year, although they did so in the first year of grouping; but Highland guards accompany the through coaches.

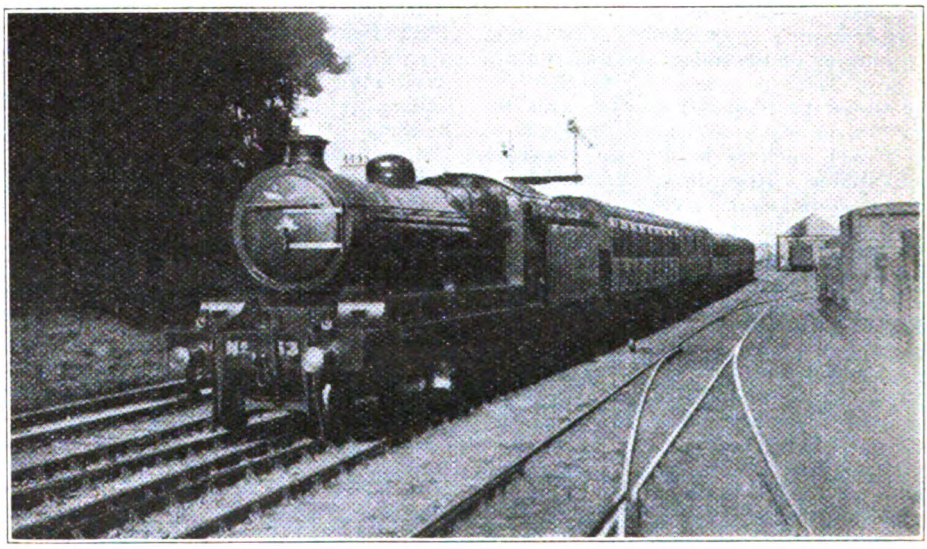

Photo.] **PERTH-INVERNESS TRAIN LEAVING NAIRN.** [*A. B. Noble.*

Highland 4-6-0 No. 53, "Clan Stewart."

"A number of the old wooden signal cabins are being replaced by substantial brick structures, especially on the Southern section, the tablet instruments being at the same time transferred to them from the booking offices where they used to be operated. The lower arms on the home signals, which were formerly used as repeaters for the starting signals at the other ends of the stations, have in most cases been removed.

"Generally speaking, the conclusion at which I arrived was that the Highlands have gained in many ways by being grouped with the Southern Lines, and

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indirectly by the introduction of more visitors from the Southern sections. One example of this was the issue during the summer months at Aviemore, Boat of Garten, Grantown, Forres, Nairn, Inverness, Dingwall and Strathpeffer, of weekly contract-tickets at a cheap rate, which entitled visitors to travel as often as they desired over the section of the line between Aviemore, Fortrose and Strathpeffer, by either the Carr-Bridge or Forres route. These facilities were, however, available only for holders of return tickets from stations south of Perth or Aberdeen, so that they could not be utilised by local residents. As an old inhabitant of a Highland village, I cannot help feeling rather sad at the disappearance of the familiar green engines and carriages, not to speak of the familar uniforms and faces."

Memorial to Sir William Acworth.

A COMMITTEE has been formed to raise subscriptions for a memorial to the late Sir William Acworth. The letter issued to the Press states that "no man has had a greater influence on the railways of the world in the current century," and it gives details of a few of Sir William's main contributions to railway development. It is signed by Lord Ashfield, Sir W. H. Beveridge, the Rt. Hon. H. G. Burgess, Sir Guy Granet, Sir Lynden Macassey, Sir Felix J. C. Pole, Mr. R. H. Selbie, Sir Herbert Walker, and Sir R. L. Wedgwood. The committee formed to commemorate his memory is a strong one. It comprises the signatories mentioned, together with representatives of the Institute of Transport, the Railway Students' Association, and the Commerce Society, with Mr. W. Tetley Stephenson, Head of the Department of Transport at the London School of Economics, as Secretary. The original idea, we understand, was quite a domestic matter, but once the suggestion was noised abroad, so much interest was taken in it that the scheme has been enlarged. The form of memorial is not yet decided, but it is felt that it would most fittingly be placed in the London School of Economics, with which Sir William Acworth's name is so closely associated.

Oil-Electric Cars in Canada.

THE problem of short-distance haulage particularly affects the Canadian National Railways, and the selection of a type of vehicle best suited to requirements has been decided by Mr. C. E. Brooks, Chief of Motive Power, in favour of employing rail motor-cars equipped on the Diesel electric principle. The engines have been designed and manufactured by Wm. Beardmore & Co. Ltd., in consultation with the Canadian Railway engineers, the result being the development of a unit which, while retaining the light weight and other essential characteristics of the aero engine, operates on the Diesel principle and burns crude oil of the cheapest variety.

Two types of cars have been designed. The one in which the smaller engine is fitted has a body with an overall length of 60 ft. set on two four-wheel bogie trucks, and including an arrangement for attachment of a trailer when desired. It carries 56 passengers, with ample space for luggage. The second and larger car is of the articulated type, similar to those recently introduced for passenger service on some English lines, *i.e.*, it consists of two carriages, the outer ends of which are placed on four-wheel bogies, while the inner ends meet at the centre of a third four-wheel bogie. The total overall length of this car is 102 ft. It weighs 94 tons, and has a wheelbase of 85 ft. 10 in.

The electrical power is developed by a specially-designed direct-current Westinghouse generator of 200 kw., 600 volts. The equipment of the smaller type of car is based upon the system which has been developed by the General Electric Company of America, and carried out by the British Thomson-Houston Co. Ltd., of Rugby, England.

Trials of these cars took place recently in Canada, and the first two are already in service. The larger car attained a maximum of over 60 m.p.h., and did a distance of 117 miles in 2 hours 15 min. running time, an average of 52 m.p.h. The fuel consumption worked out at 3½ miles per imperial gallon, which represents a fuel cost of less than 3 cents (1½d.) per mile. On the same run the cost of operating a steam train of the same capacity works out at from 20 to 27 cents (10d. to 1s. 1½d.) per mile.

Record Performances.

THE smaller car recently completed a run from Montreal, Que., to Vancouver, B.C., a distance of 2,937 miles, in 67 hours. Not only was this the fastest run on record for such a distance, but it is the longest non-stop run in the history of rail transportation, as during the whole of the trip the engine of the car did not once stop running.

From first to last the trip demonstrated the special capabilities of the oil-electric car. Arranged primarily as an endurance test for the engine, not only did the run prove this point, but it also showed the speed possibilities of the car over long distances. At one point in Western Canada the car covered 22 miles in less than 22 minutes, and one of the steepest grades in the Rocky Mountains was climbed at an

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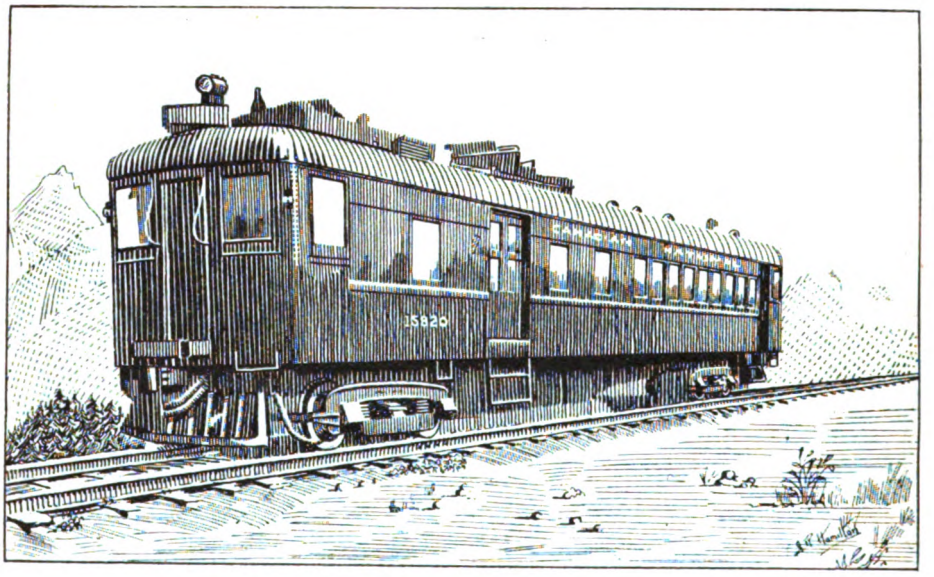
average speed of 40 miles per hour. The average speed for the entire trip was slightly under 43½ miles per hour.

The engine employed is believed to be the lightest of its kind in the world outside of aero practice, and, with the generator, is confined to a small space in one end of the car. The car-body has an overall length of 60 ft., and has seating accommodation for 57 passengers. In addition there is a large baggage space. The car can be operated by direct or remote control, there being a motorman's room at each end. Three oil-electric cars are now in regular service on the lines of the Canadian National Railways in Ontario and Quebec, and six more will be placed in operation on various parts of the system.



Sketch by] **RAIL CAR WHICH MADE JOURNEY ACROSS CANADA.** [*Ivan. T. Hamilton.*

Railway Bills in Parliament.

A SUBSTANTIAL amount of construction work is foreshadowed by the notices of railway Bills and Scottish Provisional Orders for the coming session, which number eleven altogether. None of the four big railway companies is unrepresented in the list of new promotions, but the London and North Eastern, which had a comprehensive works programme in its Act of 1925, is now content with a Superannuation Fund Bill. The works for which authority is sought by the Great Western, London Midland and Scottish, Southern, Metropolitan and "Underground" Companies are designed for the improvement of existing traffic facilities rather than for railway extensions. New ground is, however, broken by the Mid-Nottinghamshire Joint Railways promotion of the London Midland and Scottish and London and North Eastern Railways as the outcome of an agreement reached in Committee last summer when the two companies had Bills more or less competitive with each other for serving the colliery areas between Nottingham and Retford.

To the proposals intended in the Great Western Railway Bill reference was made last week. The London Midland and Scottish Bill contemplates the construction of two branches to the Thoresby Colliery of a total length of nearly 3 miles, and of a Welbeck Colliery branch of 3¼ miles in length. It also contains proposals as to the maintenance and user of part of the Rufford Colliery branch and for amendment of existing provisions as to the public conveyance of passengers on the Clipstone Colliery branches authorised by the Act of this year. The Southern Railway Bill proposes numerous widenings and new spurs in the London area, which provide apparently for connecting Victoria with the South Eastern main line near St. John's, new links between the North Kent and Mid Kent lines, a connection near Peckham Rye between the South London and Crystal Palace lines, widenings of and new connections with the Catford loop and widenings between Beckenham Junction and Shortlands. Other important widenings are those of the South Eastern main line from the southern end of Sevenoaks tunnel to Ton-

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bridge, and between Paddock Wood and Headcorn. Improved coast communications are intended to be provided by new links between the main line and the Ashford and Hastings branch, and outside Brighton an alteration of the Preston Park and Hove spur line and a new railway in connection therewith are designed to facilitate traffic working between Brighton and the western coast line. Widenings are also proposed of the Bournemouth Direct and of the Ringwood lines between Bournemouth and Christchurch, and of the Isle of Wight Railway between Sandown and Brading. A new connecting line is projected at Rochester between the Chatham main line and the North Kent.

The chief new work contemplated by the Metropolitan Railway is a new line of about 3 miles in length, to a great extent apparently of a tube character, from a point near Kilburn and Brondesbury Station to a point near Edgware Road Station, which will not only act as a relief to the Baker Street-Harrow Extension, but will give it a new connection with the Inner Circle. A new subway near Elephant and Castle, alterations at Charing Cross, improvements at Camden Town, Stamford Brook, Hounslow Barracks and St. James's Park stations, and widenings on the Ealing Extension and Hounslow lines are among the objects of the Bill to be promoted by the London Electric and Metropolitan District Railway Companies. The Manchester Ship Canal Company has also a Bill for the construction of new railways of about 2½ miles length in all, connecting with the Shropshire Union line of the L.M.S.R. Company.

Separate Superannuation Fund Bills are also being promoted by the Southern Railway and by the Manchester Ship Canal Companies. Powers to raise additional capital will be contained in the Bills of the London Midland and Scottish, Metropolitan, Southern and "Underground" Companies. A Scottish Provisional Order is being promoted by the London Midland and Scottish Company, which will provide for the acquisition of lands at Wishaw and at Rogart, and for confirming the acquisition of lands at Gleneagles and elsewhere.

Continental Pullman Developments.

NEW restaurant Pullman cars are now under construction for the International Sleeping Car Company in view of early extension of Pullman car services to the Continent. Orders for thirty more Pullman cars have just been placed with British rolling-stock builders, and a similar number with Continental firms, whilst further orders are under negotiation.

As at present arranged, the new Pullman trains will start running between Calais and Paris on May 15, 1926. From that date it will be a simple matter to book a seat in Pullman cars, working on either side of the Channel, right through from London to Paris. On the Calais–Paris service there will be two trains each of ten Pullman cars. Each train will have a seating capacity for 300 first-class passengers. Owing to the larger Continental structure gauge, it has been possible to make some improvements in the design of the interior lay-out of the cars as compared with those running on British railways, but the extra space available is all being devoted to providing extra comfort for the passengers. That is to say, the seating arrangements will be practically the same as on the Pullman cars in this country; one comfortable arm-chair on either side of the gangway, and each chair facing a table. Each of the new Pullman cars will be 77 ft. in length and 9 ft. 5 in. wide, and every second car will have a kitchen and pantry, thus facilitating a simultaneous and rapid service of meals throughout the entire train.

Non-stop Runs on the Northern Railway of France.

As a result of the trial non-stop runs recently made on the Northern Railway of France between Paris and Calais, with a train composed entirely of the new type of all-steel restaurant car by the Wagons Lits Company, the distance of 187½ miles being performed in less than three hours and under most comfortable conditions, it has been decided that the new all-Pullman trains between Calais and Paris will be accelerated. Probably the new service will be about half an hour quicker than the present fastest timing of 3 hours 25 minutes. It is possible that arrangements will be made for Customs examination of passengers' baggage to be done on the train. If this scheme eventuates it will be a boon greatly appreciated by Pullman travellers, as it will enable the train to be got quickly away from Calais after the arrival of the steamer, and should be equivalent to a saving of another half-hour on the through journey from London to Paris, or a total saving, with the faster train, of about an hour. Exactly what the supplement fare will be for the Pullman service between Calais and Paris has not yet been definitely decided. As the supplement for the 76 miles between London and Dover is 3s. 6d., it is probable that the supplement for the 188 miles between Calais and Paris will be about the French equivalent of 10s. It will be an expenditure that few first-class travellers will begrudge, securing them, as it will do, railway travel under the most luxurious

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conditions, a reserved seat easily found, no waiting or queueing up for meals, a much quicker journey, and the avoidance of the usual scrimmage at the Customs.

In addition to the Calais–Paris Pullman service to be inaugurated next May, another interesting Pullman development has already come into operation On December 15 a daily service of all-Pullman trains started between Milan and Cannes *via* Genoa, Ventimiglia, Monte Carlo, and Nice. The time taken for the through journey is eight hours. Each train is composed of six Pullman cars. For the time being this new service will be operated by Pullman cars of the standard type in service in Great Britain, which have been shipped over to the Continent by means of the Harwich train ferry. Negotiations are also in progress with the Belgian State Railways which, if concluded satisfactorily, will result in a Pullman train being run between Ostend, Brussels, and Cologne.

Incidentally, the new Pullman developments above described typify once again the really extraordinary energy and pertinacity of Sir Davison Dalziel, the Chairman of the Pullman Car Company, and President of the Managing Committee of the International Sleeping Car Company, who in a comparatively few years has so successfully extended the influence and the comfortable travelling facilities afforded by these two important transport companies. Moreover, whenever possible, he has persistently exercised his influence in favour of his own country. While a due regard has been given by him to the equities of the situation in the division of orders for rolling-stock amongst the various countries in which his extensive services are worked, he has nevertheless been able to ease British unemployment to a very considerable extent by giving in these times, when they are greatly needed, substantial orders to British rolling-stock builders.

The Great Western Railway in Cornwall.

In view of the various supplementary "Pertinent Paragraphs" which have followed the publication of his article in the September number, Mr. Hopwood points out that he was aware of many of the facts which have been brought to light, though, in view of space limitations, he did not deal with them himself. It is further pointed out that many of the facts given by Mr. R. Abbott, and quoted in the "Pertinent Paragraph" on page 515 of the December number under the heading of "The Cornwall Minerals Railway," were taken from articles published in the *Locomotive Magazine*. This, by the way, was admitted by Mr. Abbott, but in adapting the information he sent for paragraph use, the acknowledgment to our contemporary was inadvertently omitted. Mr. Hopwood points out that the Goonbarrow branch was not opened until 1893, so that it could not come under the 1877 agreement.

National Wages Board Decision.

The decision of the National Wages Board on the claims by the railway companies for certain reductions in the wages of "conciliation grades" and by the National Union of Railwaymen and the Railway Clerks' Association for improved conditions of service, which were heard in public by the Board from November 16 to 20 inclusive, was issued on December 9. There were two reports, one signed by the Chairman and 13 members of the Board (including Sir Felix J. C. Pole and Sir Herbert Walker), and another signed by Sir Ralph L. Wedgwood, the Rt. Hon. H. G. Burgess and Mr. J. H. Follows, who, though accepting the decision of the majority, put on record their disagreement on certain points. As was generally expected, the majority report makes no alteration in the scales of wages for existing members of the staff, and grants none of the new concessions asked by the two railway unions. Whilst coming to the conclusion that the railway companies have failed to make out a case for relief by an immediate reduction in wages, the majority of the Board nevertheless made a concession to the companies in the case of new entrants, on and after February 1, 1926, who are to be paid at the "B" rates. The Board also made it quite clear that there is no finding by them that the "B" rates constitute an irreducible minimum.

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WHAT THE RAILWAYS ARE DOING.

At a meeting of the General Managers' Conference of the Railway Clearing House on December 8, Sir Felix J. C. Pole, General Manager, Great Western Railway, was unanimously elected Chairman of the Conference for the year 1926.

* * *

Mr. A. E. Bolter, Secretary, G.W.R., will retire on January 16, after completing fifty-five years' service. Mr. F. R. E. Davis, Assistant Secretary, has been appointed Secretary in succession to Mr. A. E. Bolter. The directors of the G.W.R. have also authorised the following appointments:—

Engineering Department (effective from January 1, 1926):

Mr. J. C. Lloyd, Joint Chief Engineer, to be Chief Engineer. (Mr. W. Waddell, Joint Chief Engineer, will retire on December 31, 1925.)

Mr. R. Carpmael, Assistant to the Joint Chief Engineers, to be Assistant Engineer, Paddington.

Mr. E. G. Matheson, Divisional Engineer, Bristol, to be Assistant Engineer, Paddington.

Mr. A. S. Quartermaine, Assistant to the Joint Chief Engineers, to be Divisional Engineer, Bristol.

Chief Accountant's Department (effective forthwith):

Mr. T. B. Cox to be Assistant to the Accountant.

Mr. J. D. Aikman, Chief Clerk, to be Assistant to the Accountant.

Mr. A. G. Pollard to be Chief Clerk to the Accountant.

MR. G. BROUGHALL, M.I.E.E., A.M.I.Mech.E.,

Appointed Assistant Electrical Engineer (Indoor), London Midland & Scottish Railway.

Mr. George Broughall, M.I.E.E., A.M.I.Mech.E., who has been appointed Assistant Electrical Engineer (Indoor), L.M.S.R., was born on November 12, 1871, and educated at Worfield Grammar School and Mason's Science College, Birmingham. For a short time he was engaged in the works of Elwell Parker Limited, Wolverhampton, and later was articled to the Manchester and District Edison Electric Light Company. From 1891 to 1894 he was one of the engineers of the Manchester Edison Swan Company, and from 1894 to 1897 was Engineer-in-Charge of the Altrincham Electric Supply Co. Ltd. In 1897 he joined the staff of Fawcus and Clirehugh, Consulting Engineers, Manchester. In 1900 he was appointed Chief Assistant to Lacey, Sillar & Leigh, Consulting Engineers, Westminster; and in 1910 was made a partner in this firm. In 1911 Mr. Broughall joined the staff of the Chief Electrical Engineer of the London and North Western Railway as Technical Assistant, becoming in 1918 Assistant Electrical Engineer.

* * *

The directors of the London, Midland & Scottish Railway have approved the following appointments:—

Carriage and Wagon Dept.

Mr. C. W. Foxley, Works Manager, Bromsgrove, to be Works Manager, Plaistow.

Mr. E. E. Parsons, Crewe, to be Works Manager, Bromsgrove.

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Electrical Dept.

Mr. G. Broughall, to be Assistant Electrical Engineer (Indoor), Euston.

Mr. P. D. Michôd, to be District Electrical Engineer, London.

Mr. L. W. Swainson, to be District Electrical Engineer, Crewe.

Chief General Supt.'s Dept.

Mr. G. Cole, Stationmaster, and District Inspector, Nuneaton, to be District Controller, Fishponds.

Mr. H. E. Painter, District Controller, Westhouses and Blackwell, to be District Controller, Toton.

Mr. J. H. Muggleton, Relief District Controller, Chief General Supt.'s Office, Derby, to be District Controller, Westhouses and Blackwell.

Chief Goods Manager's Dept.

Mr. J. Govan, District Traffic Agent, Belfast, to be Steamship and District Superintendent, Belfast (Fleetwood and Heysham Steamers).

Mr. W. E. Yates, Euston, to be Outdoor Assistant (Running), Euston (Road Motor Section).

Mr. F. G. Jaggar, Carriage and Wagon Dept., Newton Heath, to be Outdoor Assistant (Workshops), Euston (Road Motor Section).

Mr. T. E. Argile, District Goods Manager, Leeds, to be District Goods Manager, Liverpool.

Mr. J. V. Partington, Outdoor Assistant to Chief Goods Manager, Euston, to be District Goods Manager, Leeds.

Mr. H. G. Humphreys, Assistant District Goods Manager, Broad Street, to be District Goods Manager, Warrington.

Mr. J. E. Papworth, Assistant to District Goods Manager (Cartage), Broad Street, to be Assistant District Goods Manager, Broad Street.

Mr. L. C. Brittlebank, Chief Goods Manager's Office, Euston, to be Assistant to District Goods Manager (Cartage), Broad Street.

Mr. J. W. Peace, Goods Agent, Halesowen, to be Goods Agent, Birmingham (Lawley Street).

Mr. A. Day, Stationmaster and Goods Agent, Bedford, L. & N.W. Section, to be Goods Agent, Bedford, L.M.S.

Mr. T. D. L. White, Goods Agent, Leigh, to be Goods Agent, St. Helens.

Mr. C. R. Pettingale, Goods Agent, Poplar, Victoria Docks and Thames Wharf, Midland Section, to be Goods Agent, Poplar, Victoria Docks, Thames Wharf and Canning Town, L.M.S.

Mr. F. McDowall, Outdoor Assistant, Irish Traffic Manager's Office, Dublin, to be Assistant Irish Traffic Manager, Dublin.

Mr. R. D. Roberts, Station Operating, Chief Goods Manager's Office, Euston, to be Operating Assistant to Irish Traffic Manager, Dublin.

The following will take effect from January 1, 1926.

Stores Dept.

Mr. B. M. Cooksley, to be Chief Purchasing Agent and Deputy to Chief Stores Superintendent.

Mr. T. Winby, to be Coal Purchasing Agent for England.

Mr. A. Bancroft, to be Controller of Carriage and Wagon Stores.

* * *

Mr. Herbert Jones, Electrical Engineer, S.R., and Mr. F. A. Cortez Leigh, Electrical Engineer, L.M.S.R., have been appointed the two railway representatives on the newly constituted London Joint Electricity Authority. This body consists of 33 members, representing the municipalities, electric supply and power companies, &c., and has powers over an area of 17,085 square miles. It has borrowing powers of £7,000,000. The Chairman is Mr. Duncan Watson, M.I.E.E., ex-Mayor of Marylebone.

* * *

We regret to announce that Mr. James P. Annett, a former Chief Signal Superintendent of the London & South Western Railway, died suddenly on November 24 at the age of 79.

* * *

It is with great regret that we have to announce the death, on December 1, of Mr. Julius Felix Ernest Charles Benedict, M.Inst.C.E., at the age of 87. Mr. Benedict was for a very long while well known in Indian railway engineering circles, and for the past thirty years has been associated with journalistic and literary work. Julius Felix Ernest Charles (known as Ernest) Benedict was born in 1838, and was a son of Sir Julius Benedict, the well-known conductor and composer. After being educated in London, Naples, Pisa and Paris, at the suggestion of Mr. I. K. Brunel he was apprenticed for three years to Mr. John Scott Russell, who was then building the "Great Eastern" at the Millwall Yard in the Isle of Dogs. After a little over a year he was taken into his office by Mr. Brunel. He was then for five years (1859-64) Assistant Engineer during the construction of the Bristol & South Wales Union Railway, under Mr. Charles Richardson, Resident Engineer for Mr. Brunel, and subsequently for Mr. R. P. Brereton, M.Inst.C.E. Mr. Benedict later became associated with other engineering

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TIMOTHY HACKWORTH STATUE AT SHILDON.

works in the country, after which he was engaged on various works in India.

* * *

In view of a rearrangement of operating districts, Southern Area, L.N.E.R., Mr. T. Christopher, Divisional Superintendent at Grantham, has been appointed District Superintendent at Nottingham, in place of the late Mr. H. J. Carney. The Divisional Superintendent's Office at Grantham has been closed and the district recently supervised by Mr. Christopher divided between the District Superintendents at King's Cross, Doncaster and Grimsby Docks.

* * *

Mr. William Percy Deakin, late Locomotive Works Manager, Central Argentine Railways, has been appointed to succeed Mr. M. F. Ryan as Chief Mechanical Engineer of that railway.

We regret to record the death of Mr. George M. Basford, latterly of the G. M. Basford Company, New York, but for many years associated with the American Railway Signal Association, of which he was regarded as the "father" owing to the large part he took in its formation, and as a leading authority on locomotive engineering.

* * *

Mr. R. W. Sparks, Locomotive Superintendent, Sligo, Leitrim & Northern Counties Railway, Ireland, has accepted a position in the Locomotive Running Department of the Buenos Ayres Great Southern Railway.

* * *

The association of Shildon with the early days of the railways was commemorated on Saturday, December 5, by the unveiling of a tablet at the Masons' Arms Crossing, Shildon, and a monument of Timothy Hackworth in the Recreation Ground. A sum of about £700 was raised, the L.N.E.R. subscribing £150. The tablet at the Masons' Arms Crossing was erected by the L.N.E.R., and bears the following inscription :–

> "From Shildon, near this site, the Stockton and Darlington Railway Company, on September 27, 1825, ran the first passenger train drawn by a steam engine."

Mr. A. C. Stamer, C.B.E., Chief Assistant Mechanical Engineer, L.N.E.R., who was introduced by Mr. E. Stephenson, Works Manager, Shildon, unveiled the tablet. The remainder of the proceedings were in the Recreation Ground, where the fine bronze statue of Timothy Hackworth was unveiled by Mr. T. R. Ferens, of Hull.

* * *

The results of the Station Garden Competition on the L.M.S. Railway for England and Wales show that the following stations were successful in obtaining the "Special Class" prize of £10 each :—Alcester, Ashchurch, Charfield, Credenhill, Minshull Vernon, Ockenden, Penns, and Waterloo. Eleven stations were successful in winning first-class prizes of £6 each, amongst this number being Matlock Bath, Kirklington and Tewkesbury. Idridgehay, Syston and

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Kirby Muxloe obtained prizes of £4 each. A total of 249 awards was made.

* * *

FOLLOWING the policy originally inaugurated by the Caledonian Railway, there are in operation, in Scotland alone, no fewer than 146 issues of L.M.S. zone tickets. It is estimated that upwards of 1,000,000 such tickets are issued annually. Similar tickets, or equivalent weekly seasons, are also in operation in most of the principal towns served by the L.M.S.R. in England.

* * *

ORDERS have been placed with Cammell Laird & Co. Ltd. and the Metropolitan Carriage, Wagon & Finance Co. Ltd. for 78 new cars required for service on the Morden and Kennington extensions, London Electric and City & South London Railways, to be ready for service next midsummer. 33 motor-cars and 5 trailer cars will be manufactured by the first-named firm, and 40 trailer cars by the second.

* * *

THE L.N.E.R. are to carry out considerable improvements at their locomotive depot at Whitemoor, near March, by installing a mechanical coaling plant, to be operated electrically, constructing a triangle for engine turning purposes, providing additional water facilities and carrying out other alterations which are anticipated to have a very beneficial effect on the working. The whole scheme will cost £43,000.

* * *

CERTAIN provincial newspapers recently quoted an instance where a train from Middlesbrough to Darlington travelled *via* Stockton as another case of "a train which took the wrong turning." We are advised officially, however, that a derailment at Eaglescliffe rendered it necessary to send trains for Darlington to Stockton, and to reverse there in order to avoid the obstruction. The delay involved did not exceed 10 minutes.

* * *

AT a meeting of the Institute of Transport, Metropolitan Graduate and Student Society, on November 10, Mr. B. Wagenrieder read a paper on Dutch and Belgian signalling methods, in which he drew attention to the double-wire working of points and signals, the use of the route lever in interlocking frames, and the provision of white boards or "beacons" marked with black stripes, to warn engine drivers, particularly in fog, of their approach to fixed signals. Siemens & Halske lock-and-block instruments were also referred to.

AT a meeting called to consider the formation of a group of Toc H at Penzance, Cornwall, on Friday, November 13, Mr. E. A. Gurney-Smith, of Bromley, Kent, produced a letter which he had received from Sir Felix Pole, in which the General Manager of the G.W.R. said: "I am very glad indeed to hear that the Toc H movement has extended so widely as to reach the West of England, and that consideration is being given to the formation of a branch at Penzance. I sincerely hope that this effort will be entirely successful—as it deserves to be—and that before long your fine organisation, with its ideals of comradeship and goodwill, will be firmly established in Cornwall. I hope that many railwaymen will be induced to join the movement."

* * *

THE Metropolitan District Railway Company have arranged with the Heston and Isleworth Urban District Council to change the names of the three District Railway stations in the council's area from Tuesday, December 1, as follows:—Hounslow Town to Hounslow East; Heston Hounslow to Hounslow Central (for Heston); Hounslow Barracks to Hounslow West.

* * *

A plan is reproduced showing the new line, for the construction of which the Metropolitan Railway Company is seeking Parliamentary powers. The new line, assuming Parliamentary assent is given, will run parallel, on a falling gradient, with the existing route, from a point immediately south of Willesden Green station as far as Maplesbury Road, a short distance north of Kilburn and Brondesbury station. The new line will then change direction and burrow under the last and local lines, entering two deep level tunnels which will pass under High Road (Kilburn), Maida Vale and Edgware Road, joining the Inner Circle lines by means of a 200-yard "cut and cover" section a few yards west of Edgware Road station. The "tube" method of construction will be adopted. The tube tunnels will be constructed of cast-iron segments to the exceptional diameter of 15 ft. 6 in., in order that main-line rolling-stock and electric locomotives may operate through them, while the distances between the tunnel rail level and the street level will vary from 25 ft. 6 in. to 75 ft. 9 in.

* * *

AT Edgware Road the track lay-out is to be entirely altered, the station structure demolished, and an enlarged and remodelled building erected, while four platforms, each capable of accommodating 8-car trains, are being provided, instead of two short platforms as at present. Another scheme that

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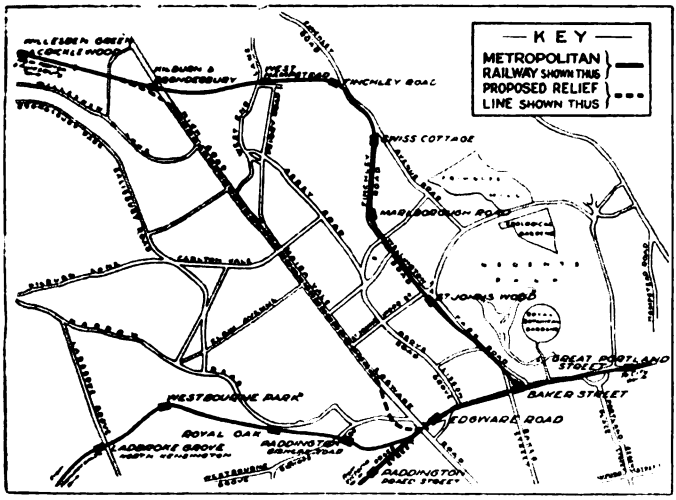

MAP SHOWING LOCATION OF PROPOSED AND EXISTING LINES, METROPOLITAN RAILWAY.

will interlink with the proposed relief line is the work of doubling the section of the Inner Circle, which is now well in hand. This consists of electrifying and utilising the present steam lines which run parallel with the Circle lines from King's Cross to Moorgate, involving the construction of a length of tunnel between Euston Square and King's Cross. This scheme, which it is expected will be finished this month, will provide an alternative route to Moorgate, and allow of the operation of additional trains. In order further to expedite traffic, the signalling sections between Wembley Park and Harrow are being rearranged, and additional train sections introduced. Three-aspect colour light signals will be used, together with fog repeater signals.

* * *

OWING to the death of Her Majesty Queen Alexandra, the 34th annual smoking concert of the London and North Eastern Railway (King's Cross Literary Society), which should have taken place at the Queen's Hall on Friday, November 20, under the presidency of Mr. William Whitelaw, Chairman of the London and North Eastern Railway, was postponed. The concert will take place on January 8, 1926.

* * *

SINCE December 1 the electric trains between Waterloo *via* Claygate, &c., to Guildford on weekdays have been booked non-stop, instead of calling at intermediate stations. This necessitates a revision in the time of departure from Waterloo. Most of the up trains by the same route also run non-stop between Surbiton and Waterloo, but a few early morning and late evening trains call at Wimbledon. On Sundays the electric trains in both directions call at Clapham Junction and Wimbledon. The diversion of these trains to the fast lines has enabled a five-minute service to be given by other electric services for intermediate stations.

* * *

A PAPER entitled "Public Aspects of Railway Problems" was read on Thursday, December 10, in the Board Room at Liverpool Street station, before the L.N.E.R. (Great Eastern) Lecture and Debating Society, by Mr. J. F. Gairns, Editor of THE RAILWAY MAGAZINE. The chair was occupied by Mr. P. Syder, London Divisional Commercial Superintendent, assisted by Messrs. F. V. Russell and W. J. Pepper, Assistants to Divisional General Manager, Southern Area, L.N.E.R., and Mr. T. Smith, Assistant Superintendent (G.N. Section). An interesting discussion followed.

* * *

AFTER making a special stop at Badminton to pick up H.R.H. the Duchess of York, the 5.15 p.m. Bristol to Paddington two-hours express recently completed the 100 miles journey to Paddington in 91 minutes, start to stop, at an average speed of 66 m.p.h.

* * *

WRITING from King's Lynn, Mr. C. M. Fison remarks that when the body of Queen Alexandra was conveyed from Wolferton to King's Cross on November 26, the L.N.E.R. royal train was used, and included a hearse coach painted black and outlined in purple, with the initials A.A. in gold on the lower panels. The curtains were of purple. The train was, of course, reversed at King's Lynn, and, in view of their being snow on the line, the rails for about 100 yards were sanded by hand before the train came in, to avoid any risk of the engine slipping when starting. Engines used were of the G.E. "Claud Hamilton" 4-4-0 class.

* * *

SEVERAL readers point out that two references to G.W. locomotives illustrated in the December number included incorrect association of numbers and names. Thus, on page 455, *Malmesbury Abbey* should be No. 4062, and not 4066, as stated on the authority of the photographer, while on page 529 the

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reference to *Windsor Castle* should have the No. 4082 instead of 4080. It is further pointed out that the illustration on page 378 of the November number does, in fact, show the North Eastern "Pacific" named *City of Newcastle*, the number of which is 2400. In commenting upon this, Mr. A. A. Lambert points out that as the engine illustrated has inside bearings to the trailing wheels, it must be either No. 2400 or 2401. Hence, presumably, it is the number which was wrongly stated and not the name.

* * *

As usual, the calendar issued by the associated "Underground" companies for 1926 is distinctive in several respects. A smaller size is adopted this time, with a gain in convenience, though the artistic attributes are fully maintained. A sheet is issued for each month, giving at the head a monthly calendar, below which a suitable poster is reproduced in colour. That for January emphasises "Brighter London," giving an indication of the illuminated signs of the theatreland district. Following months have reproductions of attractive poster views suggestive of the countryside under various aspects, with occasional touches of the humorous, as in the case of March, which has under the title of "Old World Villages of Buckinghamshire," a view including some distinctly peculiar characters. Hampton Court receives attention in April, Ken Wood in May, the Surrey Hills in June, Southend in July, the North Downs in August, Windsor Castle in September, Kent in October, Guildford in November, and the Aquarium at the Zoological Gardens in December.

* * *

NOTICE was given in the *London Gazette*, of November 27, of an application to the Minister of Transport by Alderman Charles Igglesden, Mr. Jeremiah MacVeagh, Mr. H. F. Stephens and others for an order authorising the construction of a light railway to be known as the Southern Heights Light Railway, having a total length of 15¾ miles, commencing by a junction with the Southern Railway at a point about 180 yards south of Orpington station and terminating by a junction with the Croydon and Oxted line of the Southern Railway about half a mile south of Sanderstead station. The proposed light railway will run generally in a southerly direction through Orpington, Farnborough, Keston, Downe, Cudham and Westerham to Tatsfield, and thence in a north-westerly direction through Titsey, Chelsham, Warlingham and Sanderstead. The gauge will be 4 ft. 8½ in., and the motive power steam, electricity "or such other power as the Minister of Health may approve."

* * *

TEN 2-6-4 tank engines now under construction at Brighton will be numbered and named as follows:—800, *River Cray*; 801, *River Darenth*; 802, *River Cuckmere*; 803, *River Itchen*; 804, *River Tama*; 805, *River Camel*; 806, *River Torridge*; 807, *River Axe*; 808, *River Char*; 809, *River Dart*. In addition, a similar engine with three cylinders, No. 890, *River Frome*, is under construction at Ashford.

* * *

THE Metropolitan Railway calendar for 1926 is a particularly attractive and neat production. It has been prepared by Raphael Tuck & Sons. Upon an art grey ground a lively and interesting view in the Market Place at Watford, is well reproduced in colour. Below is a block of neat monthly tear off tablets. Except for the name of the company, and the advice to "live in 'Metroland,'" the front is entirely free of advertising matter, though on the back there is a map and information in regard to the Metropolitan Railway and its connections. Copies of the calendar can be obtained on application to the Commercial Manager, Baker Street, N.W.1, enclosing 3d. in stamps to cover postage.

* * *

A train of new stock built at Lancing carriage works is being placed in service between Brighton and London Bridge for use on the 8.48 a.m. up and the 5.0 p.m. down (on Saturdays 1.5 p.m. from Victoria) "City Limited" trains. It includes 11 corridor coaches, accommodating 312 first and 192 third-class passengers.

* * *

THE annual general meeting of the Wimbledon and District Model Railway Club will be held on January 4 at 7.30 p.m. in the Red Cross Hall, Church Road, Wimbledon. January 18 will be a test track evening. On February 1 a lecture will be given by Mr. Chas. Klapper on "London's Railway Traffic Problems."

* * *

THE Manchester and District Model Railway Club has arranged for a series of lectures on the locomotive engine by Mr. N. H. Bailey. During this month meetings will be held on the 12th and 26th at the Clarion Café, Market Street, Manchester.

* * *

A RETURN issued by the L.M.S.R. states that during the first seven months of the year, including the greater part of the holiday season, the number of excursion journeys reached the huge total of 42,445,953.

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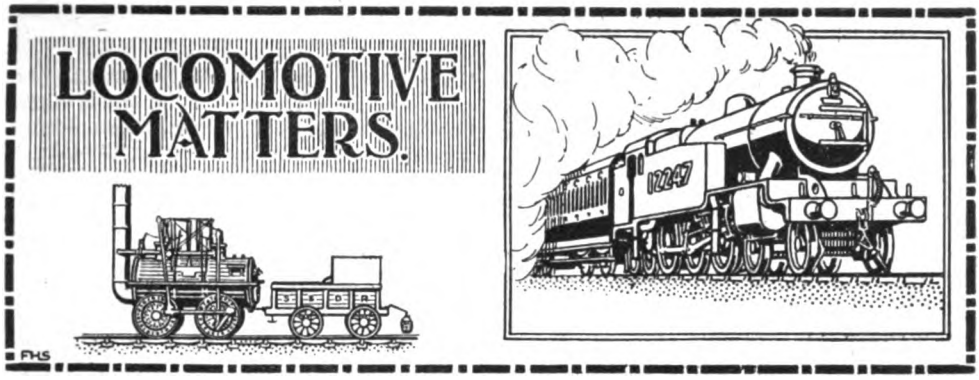

Under this heading will be inserted short references to news items relating to locomotive engines and their duties. It must be understood, however, that information as to the stations of particular engines cannot be given, for the reason that, before the date of publication, transfers may have taken place, while lists of engines, &c., debarred from "The Why and the Wherefore" section, cannot be included under this heading. With this understanding, notes as to matters thought to be of general interest will be welcomed.

L.M.S.R.

AMONG engines noted at Glasgow Central station recently have been Midland type three-cylinder compounds Nos. 1066 and 1139, also No. 1136, while Midland type compounds Nos. 1065 and 1149, together with G. and S.W. engines Nos. 14509 *Lord Glen Arthur*, and 14520 were seen at Glasgow St. Enoch station. Midland type compound No. 1142 was observed as far north as Stirling during October.—[G. W. SPINK.]

In August last Midland section Johnson 4-4-0 No. 320 was observed in its original form with small boiler, long chimney, Salter spring balance safety valves on the dome and the short pattern smokebox which indicates that the engine is unsuperheated. It was standing in New Street station, Birmingham, with a set of corridor coaches on their way from Derby to Bristol. Midland type three-cylinder compound 4-4-0 locomotives are taking turns on the two-hour London and Birmingham expresses, as is also Midland, 4-4-0, class 3, No. 765.—[D. POWNALL.]

Of the new 4-4-0 compounds of Deeley design, modified by Sir H. Fowler, those built at the Vulcan Foundry have the following dimensions: Rail to centre-line of boiler, 8 ft. 6 in., as in the original engines, and chimney, 1 ft. 7 in. high, which is shorter than before, presumably to allow working on the G. and S.W. section, and has the effect of making the engine look higher. The dome also is flattened on top.—[J. P. RICHARDS.]

Further L.N.W. locomotives working in the Furness district are 4-6-0's No. 1566 *John Penn*; No. 2275, *Edith Cavell*; No. 2625, *Buckland*; No. 2643, *Bacchus*; 4-4-0's No. 638 *Huskisson*; No. 988, *Bellerophon*; No. 1952 *Benbow*; No. 1967 *Cressy*, and others. These locomotives are shedded chiefly at Carlisle, but one or two come from Springs Branch (Wigan), and one from Crewe (North Shed). Ex L.N.W. 0-6-2 tank locomotive No. 6681 was recently seen shunting at Grange. On November 25 F.R. No. 3, *Coppernob*, arrived at Barrow. Some of the Furness goods locomotives repainted in the latter part of 1923 with small yellow figures on the tender, and small letters on cab-sides, and without raised numbers on front, are now re-painted with gold figures, and L.M.S. with red background and raised numbers on smokebox.—[G. W. KEEN.]

A Midland section unrebuilt 2-4-0 No. 145, has been seen in Manchester (Victoria), presumably working on the L. and Y. section. Of the rebuilt 2-4-0's Nos. 209 and 217 are working on the Leeds-Bradford-Shipton section, and No. 153 has been at work on the Barnsley branch. Practically all the Midland 0-6-4T are now rebuilt. No. 940, *Richard Cobden*, is the latest L.N.W. "Prince" 4-6-0 to be shedded at Bradford for work on the L. and Y. main line.—[A. P. HERBERT.]

It is understood that 80 more Class 4 superheated 0-6-0 are building at Derby. No. 4207-9 are already out, while Nos. 4210-6 are in various stages of erection in the shops. Of the earlier batch Nos. 4057-4156 are for service on the Western Division, Nos. 4177-96 on the Northern Division, and Nos. 4157-4176 and Nos. 4197-4206 on the Midland Division. Nos. 4059 and 4060 from the N.B. Locomotive Company, carry shed plates in the usual North Western position bearing the legend "Alsager." (A North Western *Prince of Wales*, No. 443, has "Stoke" similarly.) The last five

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Derby-built compounds, Nos. 1110-1114, are for service on the Western Division, as are also Nos. 1150-84. Recent additions to Kentish Town shed include seven compounds. They are Nos. 1021-6 (from Trafford Park), Nos. 1027-8 (from Leeds), and Nos. 1107-9. The first four are not superheated. The other unsuperheated compounds are No. 1010 (which, by the way, has recently been transferred from Carlisle to Leeds), Nos. 1017-8, 1022, 1043 and 1044.

There are now only four unsuperheated Class 3 4-4-0 in existence. These are Nos. 737, 751, 772, 779. (N.B.—Nos. 742, 749, 778, which were unsuperheated have been scrapped.)

With further reference to Mr. H. T. L. Champness' query, concerning Johnson 4-4-0's "running more or less in their original condition or in a form which does not entitle them to rank as rebuilds," it may be of interest to know that there are now ten of these engines in existence.—[G. H. DAVENTRY.]

Nos. 1181–4, new 4–4–0 compounds, ex Vulcan Foundry, are now in service on this section, these completing the series of 25 locomotives ordered from that firm. Some further 0-6-0 superheated engines have also arrived at Crewe from Kerr, Stuart & Co., up to No. 4100 being now in service. Latest Crewe-built engine of the same type is No. 4156. The next twenty new ones, Nos. 4157–76, are for service on the Midland Division. Engines recently turned out, painted goods black and renumbered, are as follows:—"G1" class, Nos. 1181 (9229), 1462 (9136), 2573 (9373); 19-in. goods, No. 1399 (8846); 18-in. goods, No. 213 (8535); 4-ft. 3-in. shunter (0-8-2), No. 2105 (7895). The following passenger engines have been withdrawn from service, viz.: No. 1986 *Clanricarde* (4-6-0); No. 1947, *Zillah* (4-4-0); No. 2193, *Salopian* (2-4-0); Nos. 383, 529, 791 and 1441 (4 ft. 6 in. 2-4-2T); No. 1155 (5 ft. 6 in. 2-4-2T), and Nos. 2848 and 6462 (4-4-0T.). Nos. 1039 and 1249, class "B" compounds, have been converted to class "G1" (superheater). A further ten Midland type goods engines have been put on order at Crewe. These will follow those now building. The allocation of the 100 2-6-0 mixed traffic engines is as follows:—30 at Horwich, Nos. 13000-29; 70 at Crewe, Nos. 13030-99.

[C. WILLIAMS.]

Recently a Webb compound No. 1974, *Howe*, not yet converted, worked a 2-hour express from Birmingham to London.

[H. W. HEATH.]

L.N.E.R.

"PACIFIC" type 4–6–2 locomotive No. 2569 *Gladiator*, N.E. 4–4–2 No. 709, and "Director" class 4–4–0 No. 6388 have been working into Edinburgh (Waverley) station. G.N. 4–4–0 No. 3055, with reduced chimney, dome, &c., lately worked from Glasgow (Queen Street) on a relief express for Edinburgh. This engine, under her old No. 55, used to be stationed in the Leeds G.N. district.—[G. W. SPINK.]

G.N. locomotives Nos. 3058, 3064, and 3305 have been working over the N.B. main-line between Edinburgh and Dundee. N.E. "59" class 0–6–0 locomotives are much in evidence in the Whitby district. During August Nos. 59, 235, 422, 508, 567, 606, 1106, and 1485 worked regularly into Whitby, frequently on passenger duties.—[G. H. BARTRAM.]

4–6–2 locomotive No. 4478 is now named *Hermit*. The six locomotives of the 4-6-0 "Valour" class have all been transferred to Leeds shed. Additional 0-6-2T's of G.E. design working on the G.N. section are Nos. 457 and 460, built at Gorton, and Nos. 912, 913, 916 and 919, built by Messrs. Robert Stephenson and Co., Darlington, 1925.—[C. STEVENS.]

"Pacific" type 4–6–2 locomotive No. 4481 has been named *St. Simon*, and is still stationed at Doncaster.

[We understand that our informant responsible for the statement last month that this engine had been fitted with a booster is entirely in error.—ED. R.M.]

Left-hand drive and vacuum and steam combination brakes are the new standard for the L.N.E.R. G.E. section engines Nos. 780–788 were not K15 class but classed as P55, and have since been rebuilt and classified F5. Nos. 794–799 were class O18, and differed from the Worsdell M15 class in that they have single slide bars instead of the quadruple arrangement. The original W class engines are now alone bearing the load class "W." All others, whether rebuilt as W's or still T's, are now classified T. They have a smaller firebox than the proper W's, owing to a difference in wheelbase.—[G.M.R.)

No. 7507 is a Great Eastern 0–6–0 locomotive of class Y14, built at Stratford in 1899. The 2–4–0 series, with which this engine has been confused, ends at No. 7506, while those renumbered from the "1200" series in the old G.E. list are now 7407 to 7416, that is, at the beginning and not at the end of the older series, which thus runs continuously from 7407 to 7506. This explanation clears up the difficulty.—[REV. J. A. HANCOCK, W. J. BRYDEN and OTHERS.]

The first of the Great Eastern type 0–6–2T locomotives ex Stephenson and Co., Darlington, to appear in the Leeds and Bradford

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G.N. district was No. 903. The latest is No. 941. These two engines, together with others, are all stationed at Ardsley, there being more at either Leeds or Bradford. They are superheated, fitted with both vacuum and Westinghouse brakes, have condensing apparatus, and are fitted with left-hand drive. Another new type of locomotive to appear in this district is No. 1719, a 4–6–2T of Great Central design. This engine is one of a batch of thirteen now being built by R. and W. Hawthorn, Leslie & Co., of Newcastle. The works number of 1719 is 3617. This engine, which is stationed at Neville Hill shed in Leeds (N.E. section), is the only one to come south, all the others built so far being at Newcastle. These engines differ slightly from the original ones on the G.C. and G.N. sections, in that they are fitted with Westinghouse brake, and a different type of safety valve. North Eastern section "Pacific" No. 2400 carries the class "4–6–2" on the front buffer beam.—[A. P. HERBERT.]

4-6-2 No. 2561 is named *Minoru* and No. 2562 *Isinglass*.

[G. EVERITT and M. C. PITTS.]

G.W.R.

"Castle" class 4-6-0 locomotives, taking turns with "Stars," work into the Birmingham district on the 6.30 a.m. Paddington to Wolverhampton train, returning to London on the 11.37 a.m. up express (12 noon ex Snow Hill), and also on the well-known 9.10 a.m. train from Paddington to Wolverhampton, working back with the 2.30 p.m. Cambrian Coast express (3 p.m. ex Snow Hill). Nos. 4073 *Caerphilly Castle*, 4074 *Caldicot Castle*, 4091 *Dudley Castle*, 4092 *Dunraven Castle*, 4080 *Powderham Castle*, and 4081 *Warwick Castle* have been noticed on these runs. 4-4-4T locomotive No. 27 is at work in the Midland district, and pannier tanks of the 0-6-0 type have appeared with all-over cabs. Reference was made in a recent issue to 4-4-0 engines of the "Duke" class. Though many can be seen in their native land—Devon and Cornwall—they are now dispersed over the whole system. "Moguls" have largely taken their places in the Duchy. Nos. 3268 *Clough*, 3281 *Cotswold*, 3285 *Katerfelto*, and 3286 *Meteor* have been working in the Birmingham area.—[CASTELLUM.]

The French compound *Alliance* has recently been working into Basingstoke.—[C. HAMILTON ELLIS.]

With regard to the note from Mr. F. Ward, on page 529 of the December RAILWAY MAGAZINE, concerning the presence of a 4-4-4T locomotive on the G.W.R. in the Birmingham District, it may be of interest to recall that the *Great Western Railway Magazine* for April last gave an illustration and dimensioned drawing of No. 27 of this type—formerly M. and S.W.J.R. No. 18 is as rebuilt with Great Western coned boiler and Belpaire fire box. No. 25, of the same type, was noticed at Bath G.W. station last November. This engine had a domed flush-topped boiler of presumably the original type, with G.W. pattern of safety valve casing. It bore the makers' plate of Sharp, Stewart & Co., of Atlas Works, Glasgow.

S.R.

Drummond 0-4-4T No. 126 has again been rebuilt and is now fitted with Maunsell superheater and snifting valves. It is frequently to be seen at Waterloo.—[H. A. H. HART.]

Locomotives of the "King Arthur" class regularly haul the Bournemouth-Birkenhead express between Bournemouth and Oxford. It is reported that No. 454E *Queen Guinevere* has been fitted with a water scoop tender with a view to trials on another line.—[H. J. FINCH.]

Drummond standard tank engine No. 49E is fitted with auto-train gear. Further Adams engines running with modern boilers include 0-6-0 goods No. 163E, 0-4-4T (small type) No. 223E, and 0-6-0 saddle tanks Nos. 332E and 0149 E. Adams "G" class goods engine No. 0422E, which was involved in the Lydford accident, has been repainted and lettered and was noted working over the North Devon lines recently. There are still a few Beattie goods engines working in the country districts.—[C. HAMILTON ELLIS.]

Sunday League trains on the S.W. section are generally worked by new 4-6-0's of 763 series stationed at Nine Elms. Nos. 372, 373 and 720 are all at latter depot.—[TINTAGEL.]

The engines of the 448/457 (old) series left intact appears to be three in number. There are 116 other 4-6-0 engines made up as follows:—20 Urie 6-ft. Mixed Traffic, Nos. 482 to 491, 473 to 478 and 521 to 524; 6 Drummond rebuilds Mixed Traffic, Nos. 330 to 335; 20 Urie 5-ft. 7-in. Goods, Nos. 496 to 515; 10 Drummond 4-cylinder express, Nos. 443 to 447 and 458 to 462, so far not rebuilt. With the new "King Arthur" 4-6-0's this makes 116 engines of that wheel arrangement, apart from the 3 mentioned above.—[ROBT. HEDGES.]

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ROLLING STOCK RENUMBERING, IRISH RAILWAYS.

An Irish reader sends the following particulars of the renumbering of locomotives and rolling stock on the Great Southern Railways, Ireland :—

1. G.S.W. locomotives remain as at present.

2. G.S.W. carriages retain old numbers, but are painted in new "purple lake" and carry new coat of arms.

3. G.S.W. wagons retain old numbers and colour but are lettered "G.S." in 12-in. letters (white).

4. Standard gauge locomotives of other companies will have name plates removed, and be fitted with G.S.W. type white-metal number plates. All will be re-numbered, but no particular series is being allocated to each section, the engines being numbered in "class groups" without differentiation of section. With a few exceptions the M.G.W. engines carry numbers from 530–649.

5. Narrow gauge locomotives retain their original numbers with a suffix letter to denote section.

	Suffix letters.
West and South Clare Railway	C.
Cavan and Leitrim Railway ...	L.
Cork, Blackrock and Passage Railway	P.
Schull and Skibbereen Railway	S.
Cork and Muskerry Railway ...	K.
Tralee and Dingle	T.

6. Standard gauge carriages and wagons of other companies will be painted to standard given for G.S.W. stock above. They will retain their original numbers with the following suffix letters :—

	Suffix letters.
M.G.W. Railway	M.
D. and S.E. Railway	D.
C.B. and S.C. Railway ...	B.
Cork and Macroom	R.
Waterford and Tramore ...	W.
Ballinascarthy, Timoleague and Courtmacsherry	J.

7. Narrow gauge carriages and wagons are painted standard colouring, but a smaller lettering is used for wagons. The original numbers are retained with the suffix letters given for narrow gauge locomotives.

G.C. NAMED LOCOMOTIVES, L.N.E.R.

Although in general we are not prepared to include lists of engines of particular classes, the following information as to named locomotives on the G.C. section of the L.N.E.R., supplied by Mr. G. M. Rickards, will probably be welcomed by many of our readers :—

5104* *Queen Alexandra.*
* *Queen Mary.*
5110 *King George V.*
5004 *Glenalmond.*
5258 *Rt. Hon. Viscount Cross, G.C.B., G.C.S.I.*
5259 *King Edward VII.*
5279 *Earl Kitchener of Khartoum.*
5364 *Lady Farringdon.*
5365 *Sir William Pollitt.*
5423 *Sir Sam Fay.*
5424* *City of Lincoln.*
5425 *City of Manchester.*
5426 *City of Chester.*
5427 *City of London.*
5428 *City of Liverpool.*
5429 *Prince Henry.*
5430 *Purdon Viccars.*
5431 *Edwin A. Beazley.*
5432 *Sir Edward Fraser.*
5433 *Walter Burgh Gair.*
5434 *The Earl of Kerry.*
5435 *Sir Clement Royds.*
5436 *Sir Berkeley Sheffield.*
5437 *Prince George.*
5438 *Worsley-Taylor.*
5439 *Sutton Nelthorpe.*
5446 *Earl Roberts of Kandahar.*
5501 *Mons.*
5502 *Zeebrugge.*
5503 *Somme.*
5504 *Jutland.*
5505 *Ypres.*
5506 *Butler-Henderson.*
5507 *Gerard Powys Dewhurst.*
5508 *Prince of Wales.*
5509 *Prince Albert.*
5510 *Princess Mary.*
5511 *Marne.*
6097 *Immingham.*
6164 *Earl Beatty.*
6165 *Valour.*
6166 *Earl Haig.*
6167 (*Lloyd George*) Removed August, 1923.
6168 *Lord Stuart of Wortley.*
6169 *Lord Faringdon.*

* Our correspondent is uncertain as to these engines.

No. 429 was originally *Sir Alexander Henderson*. In 1917 (*circa*) it was renamed *Sir Douglas Haig*, and in 1920 renamed *Prince Henry*. Presumably, 5509 is now *Duke of York*.

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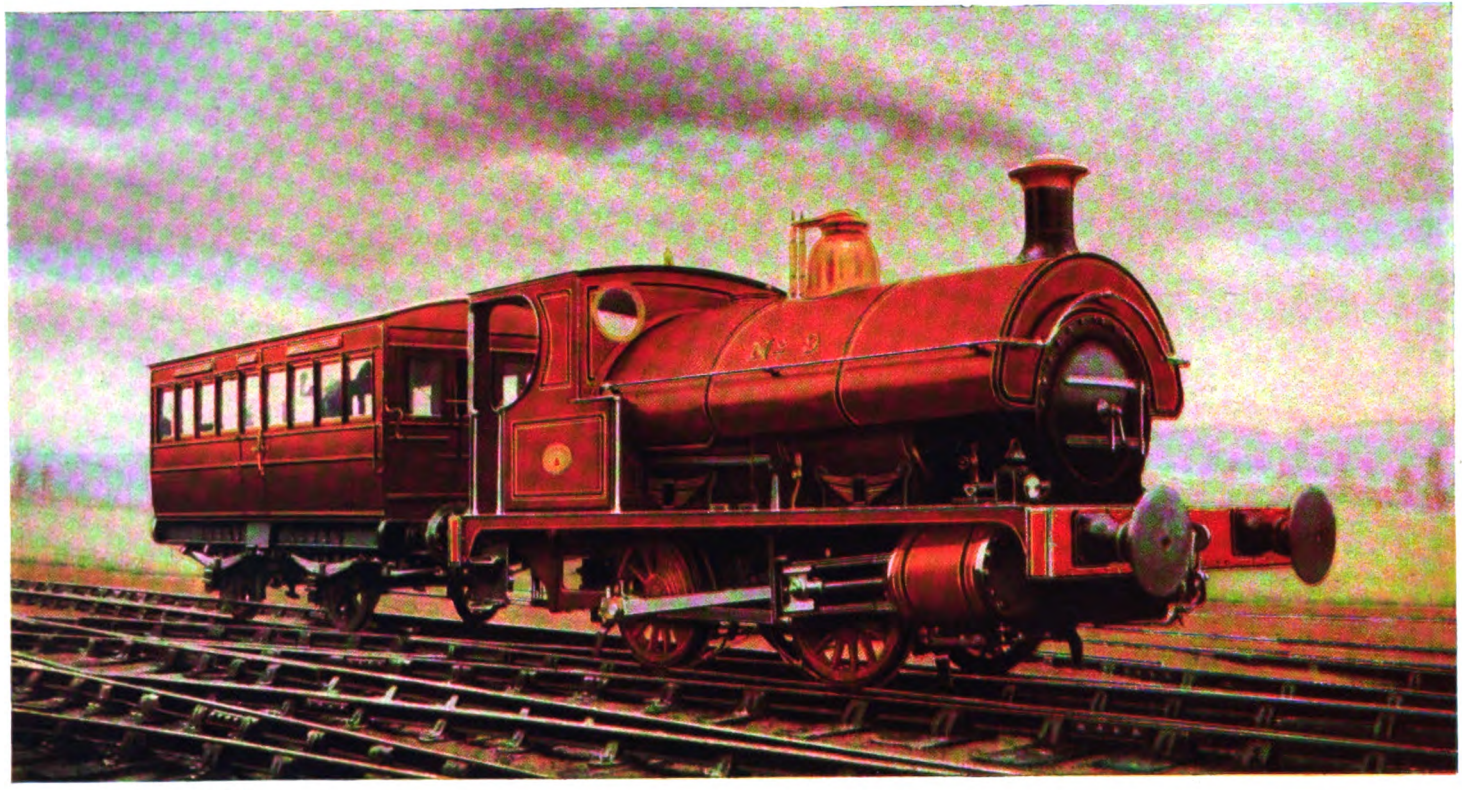

THE RAILWAY MAGAZINE.]

PRIVATE LOCOMOTIVE No. 9, and VISITORS' SALOON.

Owned by Messrs. Bass, Ratcliff & Gretton, Limited, Burton-on-Trent.

Type 0-4-0 "A" Class, Saddle Tank Engine, designed by the firm's Locomotive Department.

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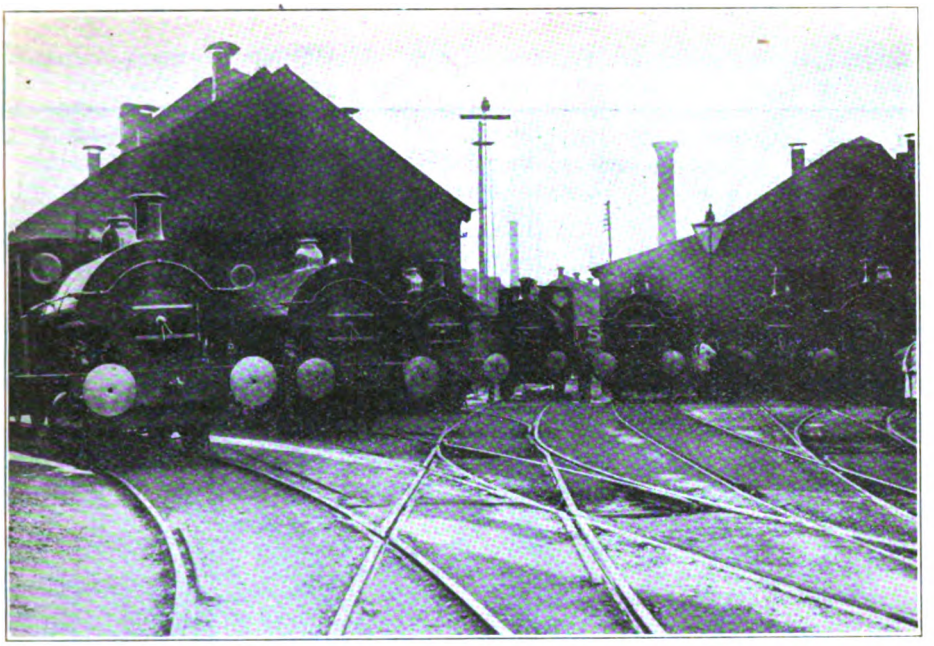

BASS & CO.'S LOCOMOTIVES AT SHEDS, READY FOR THE DAY'S WORK.

A Notable Brewery Railway System.

Messrs. Bass, Ratcliff & Gretton operate at Burton-on-Trent a Railway System, in conjunction with the L.M.S.R., which ranks as one of the most notable of its kind.

THE commercial development of Burton as a centre of the brewing industry commenced about 150 years ago, and at a comparatively early date certain of the breweries sent their products regularly to London and elsewhere by horse wagon. Distribution was, however, limited by the difficulties of transport and the slow and costly process of proceeding along the badly maintained roads then existing. Something was done to help matters by the improvement of coaching routes for fast services, and more when canals enabled heavy loads to be moved cheaply and certainly, if slowly, but the problem was not solved until the advent of the railway.

The firm of Bass, Ratcliff & Gretton is founded upon a business established in 1777, while several other breweries in the town can also claim an ancient and honoured history. Of the brewery undertakings, however, that of Bass, Ratcliff & Gretton Limited is by far the largest. To meet the ever-increasing demands for their ales the breweries extended throughout the town, until, for the want of available building land, they have spread to the outskirts, at Dixie and Shobnall, and now stand on an area of some 800 acres. As a result, in that part of the old town located between the L.M.S. (late Midland) main line from Birmingham to Derby and the River Trent there are four substantially independent yet rail-connected series of premises. Near the river bank there is the Old Brewery, with the General Offices in High Street adjacent. On the other side of High Street is the Middle Yard, together with the electric and repairing cooperages, cask-washing plant and barley stores. Across Guild Street the Middle Brewery includes maltings, hop stores, ale stores, engineering workshops, &c., and beyond Station Street there is the New Brewery, together with its extensive maltings, stores, &c.

Although close together, these premises

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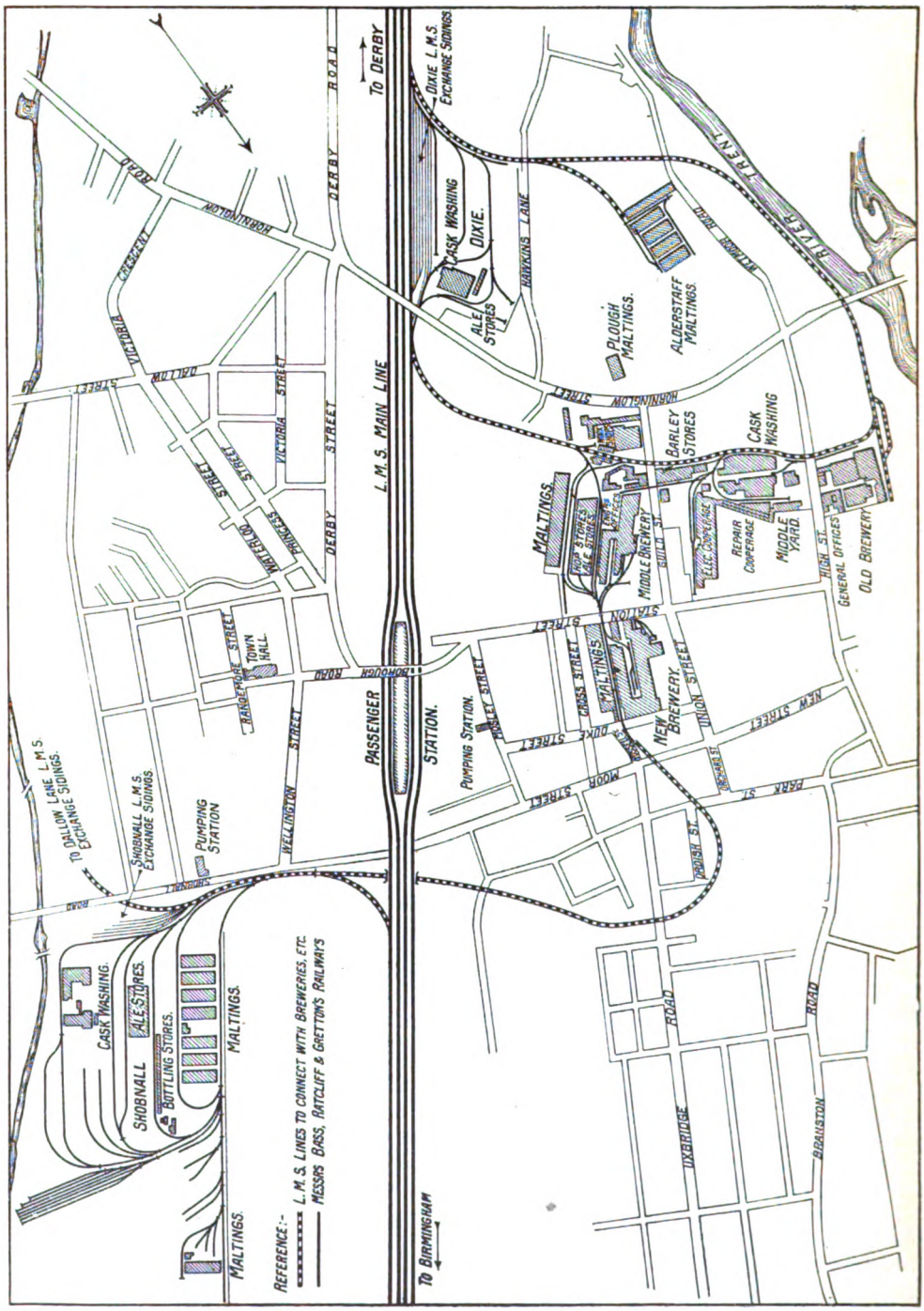

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necessarily cover a considerable area; and as from early days a primary necessity was the provision of direct connection with the Midland Railway, in that even 50 or 60 years ago a daily exchange of several hundred wagons was called for, a fairly elaborate railway system, both within the area concerned and to connect with the Midland line, was at that time essential. As will be seen from the map reproduced, there is a lengthy mileage—largely through the town itself—of railway constructed by the late Midland Railway in order to give access to the various breweries and other industrial establishments, and, in addition, many miles of railway track which are privately owned by the firms concerned.

Some idea of the magnitude of their railway system will be gathered from the fact that Bass, Ratcliff & Gretton operate, by means of their own engines, railway traffic over 16 miles of private line, while their running powers over the L.M.S.R. bring the total mileage to 26. Except for occasional trips by L.M.S.R. engines on to the private line at Shobnall, Bass & Co.'s traffic to and from the Exchange Sidings at Dixie and at Shobnall is all worked by their own engines.

The traffic thus involved is very large. Indeed, it is correct to say that, on an average day, Messrs. Bass's engines handle 1,000 wagons and sometimes a greater number. About 350 to 400 of these are in the form of empties received either direct from the L.M.S. and L.N.E. railways or wagons liberated from traffic and subsequently distributed to the various breweries and yards as required, with, of course, the same or a larger number going away loaded. The remainder are concerned in inter-brewery traffic, in that, although each brewery is operated on a more or less self-contained and independent basis, a degree of internal traffic is essential. This consists partly in the distribution of malt, barley, coal, &c., and in meeting the hundred and one miscellaneous requirements inevitable in an undertaking of so great a magnitude. Another important point is that the private railways, together with the industrial branches of the L.M.S.R., in many places cross busy public thoroughfares, in which respect the brewery town is probably unique. This has necessitated the provision of signal cabins at the various crossings, while an interesting feature of Bass & Co.'s traffic operation is that, as far as possible, trains are worked to schedule times, and that to co-ordinate the numerous and specialised various factors a system of train control has been instituted with great advantage.

In view of the interest attaching to a railway system of this character, we are indebted to Bass & Co. for the opportunity to inspect the system as a whole, and to study the methods of traffic operation and control as now carried out. Before describing the system in detail, however, reference must be made to certain historical aspects, in that many of the more unusual features of industrial traffic operation in the town of Burton-on-Trent cannot be fully understood except on that basis.

Up to the years 1859-60 the method of despatching ale from the breweries was to send it to the station in low two-wheel carts, known as "floaters." No alternative method was seriously considered until the Midland Act of 1859 was passed, giving the railway company powers to construct two branch lines with direct access into the brewery premises. The scheme, however, involved the making of level crossings across the streets, to which there was a certain amount of local opposition. It was maintained that the greatest inconvenience would be inflicted on the public by the constant interruption of road traffic caused by trucks being drawn across the streets, and, secondly, that the crossings were not for the public benefit, but for the convenience of private individuals only. The position was inquired into by a Select Committee of the House of Lords in 1860, which found that serious inconvenience was already being caused to the public by the volume of traffic passing between the breweries and the railway station.

As the brewing industry had by that date already become one of considerable magnitude, the traffic to the station carried by these "floaters" had grown to so great an extent that, notwithstanding the natural objection of residents to the crossing of public thoroughfares by railway tracks, it had become obvious that it would be both to the public and private advantage that railway lines should be constructed through the town, notwithstanding that this would entail a number of level

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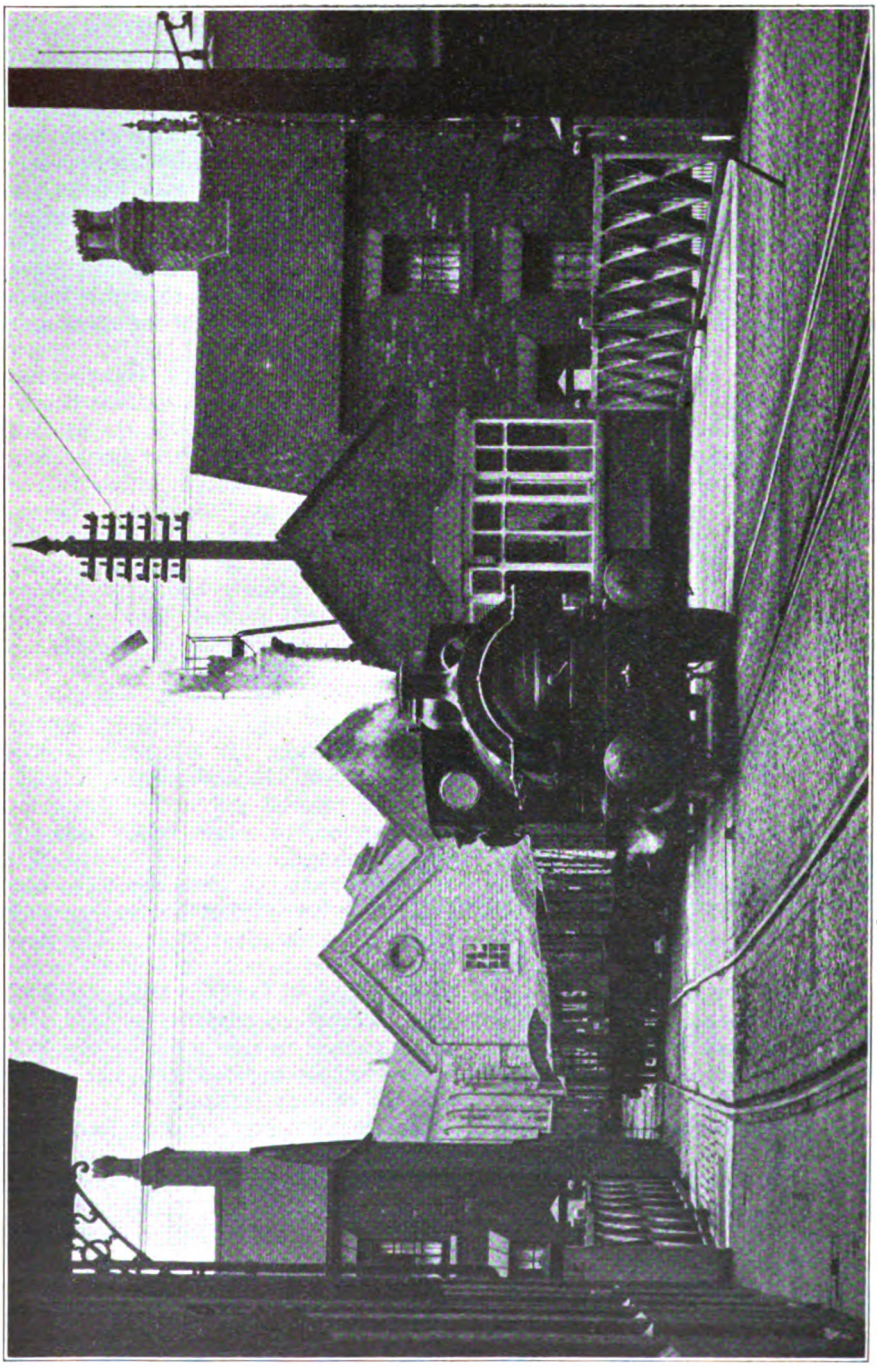

TRAIN OF LOADED WAGONS PASSING OVER STATION STREET LEVEL CROSSING.

Interior of Signal Cabin shown appears on page 97.

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crossings. Moreover, the ever increasing congestion caused by the constant stream of "floaters" monopolising the streets and the fact that this could only be remedied by the alternative of the level crossings undoubtedly carried special weight leading up to the allowing of railway tracks to be laid. Thus it came about that the branches constituting the loop from Dixie Sidings and the Hay branch (on the river bank) were, between 1860 and 1870, added to considerably by lines constructed by the firm.

Direct communication between the brewery and the railway brought great changes in the method of internal transport. Instead of carting ale to the station, private lines were built alongside the store rooms and the barrels rolled into the railway trucks. It was found that whereas a one-horse floater could take only a load of 1 ton, the contents of four floaters could be loaded into two railway trucks. Again, when it became evident that horses could not cope with the ever-increasing traffic, and that the Midland could not be expected to be at the firm's beck and call "to move a wagon here and another there," a steam engine—or "donkey" as it was then termed after Bray's traction engine—was introduced, with sufficient power to haul eight wagons at a time.

Between 1860 and 1869 further extensions had become necessary. By the end of 1862 the Old Brewery, the cooperage and the Middle Brewery were all served by means of private lines, and by 1863 powers had been obtained, under an Act of Parliament, to extend the railway by means of a level crossing across Station Street in order to reach the site on which the New Brewery was then being built. In 1865 the railway was extended across Guild Street, and between 1873 and 1876 new ale-banks at Dixie, and extensive maltings at Shobnall, were inaugurated. These additions necessitated extensions at Dixie Sidings and rail access to the new premises at Shobnall. At that time the link between the New Brewery and Shobnall had not been constructed, and temporary running powers were granted by the Midland Railway to enable Messrs. Bass's engines to run between Dixie and Shobnall through the passenger station and on the main line. When this was done the drivers were accompanied by Midland pilotmen.

By the end of 1875 three more maltings were completed at Shobnall, and there were further extensions at Dixie, including the erection of a washing plant for returned empty casks. Additional lines and sidings were laid in the breweries and cooperage yards, and as by that time there were five engines in service a new engine shed was built in 1876 to accommodate them. In 1891 the branch line leading to the maltings shown at the extreme left of the Shobnall area (p. 86) was completed, and, except for minor additions here and there during recent years, Bass & Co.'s private railway system was completed substantially as it is to-day. Eight miles of private track are situated at Shobnall, serving the maltings, cask-washing plant, experimental bottling stores and ale-loading stations, and concluding with an extensive fan of sidings known as "Klondyke," with a storage capacity for 400 wagons. The connections and sidings between the three breweries and the cooperage yard absorb a further five miles; and, lastly, with three miles of line at the Dixie Exchange Sidings and Stores, the total length of privately owned track is 16 miles.

The Old Brewery is in direct connection with the "Hay" (riverside) branch of the L.M.S.R. from Dixie Sidings. The Hay branch is double track, with several storage and siding lines between the Old Brewery, the River Trent and Bridge Street, though not all of these are associated with Bass & Co.'s traffic. Their traffic is brought alongside their premises *via* a sharp curve to a bank line, where ale is loaded for despatch, and also to one or two "lay-by" sidings.

Crossing High Street, three tracks are laid, with signal cabin and signal protection. Just beyond the crossing is another cabin—Church Croft Junction—which governs a number of the sidings connections hereabouts, including the empty cask unloading bank, cask-cleaning plant, and the line which serves the electric and repairing cooperages, &c. Beyond Church Croft Junction the main line continues past the Barley Stores and Bonded Stores to the Guild Street Crossing There are, in fact, two Guild Street crossings; one L.M.S., and the other a private line which gives direct access to

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the Middle Brewery from the cooperage sidings.

In the vicinity of the Middle Brewery there is quite an elaborate and complicated system of lines serving several busy and important premises each requiring constant attention, whilst access is also given to the engineering shops and new engine sheds. It is here that the large and well-equipped fire station, Control Office and other premises are situated. The Middle Brewery has, of course, its own ale-loading station, or rather two, in that there are loading banks on either side of the main ale stores. From these, too, connections are given between the through L.M.S. line and the private line both north and south, so that several signal cabins are installed. In this area both old-type cross-bar and semaphore signals are used.

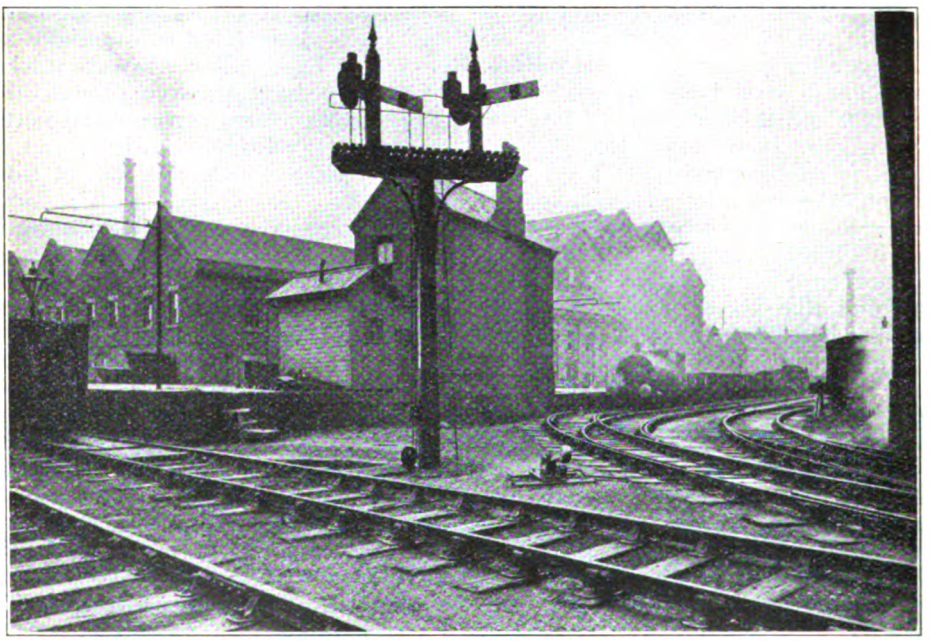
Past the Middle Brewery the private line links up with the L.M.S. branch, which runs more or less north to Dixie Sidings. Upon entering this section Messrs. Bass and Co.'s trains operate under L.M.S. signal-box control.

Adjacent to the Dixie sidings are private lines serving the Dixie Ale Stores, ale loading station and an extensive cask-washing plant. There are also private lines providing connections with the farther end of Dixie Sidings and with the L.M.S. Hay Branch, which here proceeds direct to the riverside and Old Brewery. This branch is used by L.M.S. goods trains, besides private brewery traffic, including that to and from the Anderstaff Lane maltings.

Returning to the Middle Brewery, the numerous sidings serving this centre converge again and cross Station Street, the busiest of all the level crossings.

Controlling the junction where the lines meet we noted the peculiarity of a post carrying semaphores on each side, so that both arms applied to the same direction and had their red faces on the same side, though one was necessarily pointing left and the other right.

Crossing Station Street, there are three tracks running past the New Brewery premises, the central one being the private main line reserved for through traffic operated either way under signal-box control. One of the outside lines serves the New Brewery ale-loading station, to which filled casks are brought by means of gravity runways, with lifting appliances to



JUNCTION WITH HAY BRANCH, OLD BREWERY.

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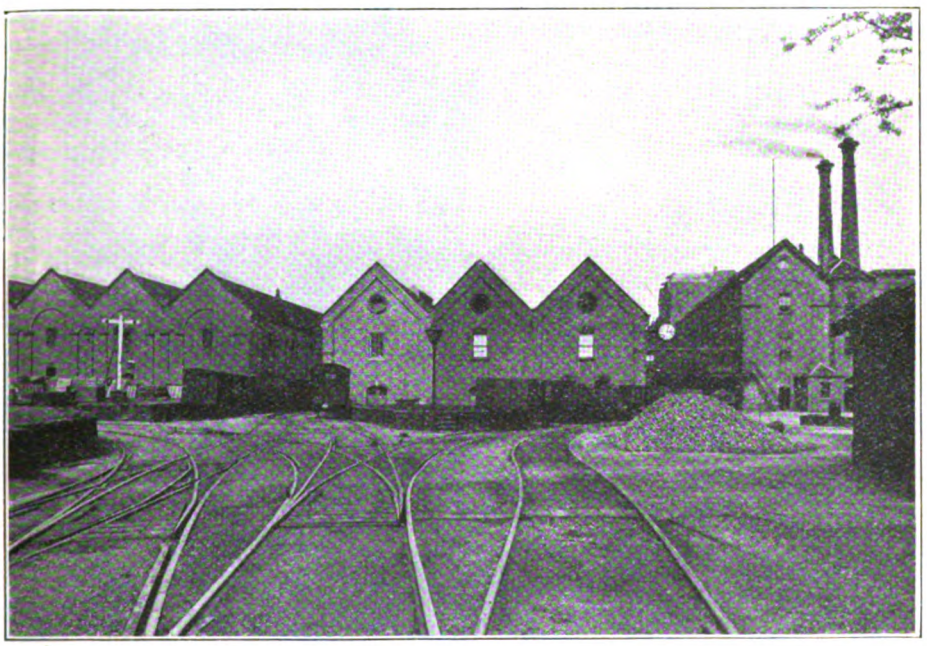
raise them automatically to bank level. The other outside line serves the maltings.

Then comes one of the most awkward sections of line, in that within a few hundred yards three level crossings are required, each with signal cabin and signal control. This is the L.M.S. Shobnall branch, which passes under their main line and across Wellington Street, from whence it develops into a four-track level crossing. At this point there diverges a long single line, which gives access to the garners of the immense Shobnall Maltings; connects with a branch line leading to No. 8 Malthouse and finally terminates at the firm's "Klondyke" storage sidings already referred to.

This line, which is jointly worked by the firm's trains, and those of the L.M.S. Railway for delivery at "Klondyke," is controlled by Tyer's electric train tablet.

The use of the tablet not only averts the possibility of either of the two Companies' trains meeting on the through line, but also protects the main maltings junction and the branch which leads up to No. 8 malthouse. Running parallel with the single line are two other lines over which Bass and Company work much of their own local traffic. These lines give access to several loops as indicated, so as to serve the experimental bottling stores, ale stores, and loading station, and the extensive cask-washing plant, on the basis of through running round the loop routes thus available. On the Shobnall Road side these lines link up adjacent with the L.M.S. Shobnall Exchange Sidings. As will be gathered from the map, there is a very extensive and elaborate railway system in this area. The L.M.S.R. loop continues round through Horninglow to rejoin the main line towards Derby some distance beyond Burton passenger station.



MIDDLE BREWERY JUNCTIONS, APPROACHING STATION STREET CROSSING.

As stated earlier, the volume of traffic dealt with in the course of a day's work amounts on an average to 1,000 wagons. This traffic, representing three distinct services, falls under the following headings:—

A. *Arrival Traffic* handed over by the L.M.S. and L.N.E. Railway Companies.

B. *Internal Traffic*.—Travelling between one department and another.

C. *Departure Traffic*.—For despatch to L.M.S. and L.N.E. Railway Companies.

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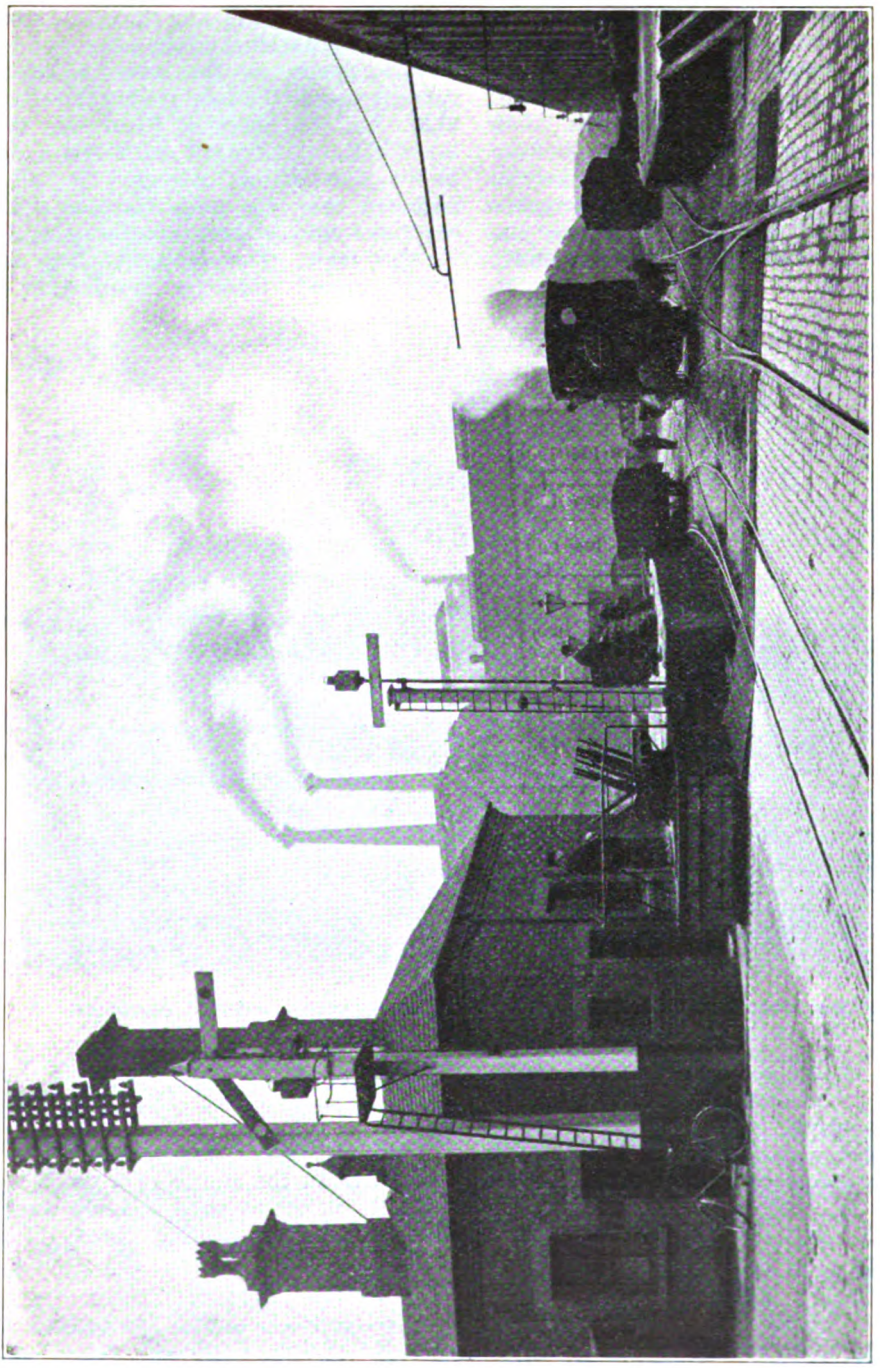

A BUSY TRAFFIC CENTRE, MIDDLE BREWERY. SHOWING SEMAPHORE AND CROSS-BAR SIGNALS, AND OUTDOOR SIGNAL FRAME.

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ARRIVAL TRAFFIC.

The traffic is made up as follows:—

1.	Up Brewery trains ..	(Malt to breweries).
2.	,, Empty wagon trains	(For ale-loading stations).
3.	,, Malting department trains	(Barley for malting).
4.	,, Cooperage department trains	(Empty casks).
5.	,, Hop department trains.	
6.	,, Coal trains.	
7.	Oddments.	

1. *Brewery Trains.*—These trains convey loads of malt handed over by the L.M.S. and L.N.E. Companies for delivery at the three breweries. To ensure punctuality, which is essential in order to meet the requirements of the department, they command a right of way over all other "up" traffic.

2. *Empties.*—The arrival of empty wagons at the five loading stations is timed to correspond with the departure of the outwards loaded trains, which working is similar to the provision of empty coaches at termini stations. It may be here stated that the facilities at each of the ale-loading stations will accommodate complete trains on both sides.

3. *Grain Department.*—Incoming barley for manufacture into malt requires special handling, and differs from that of other traffic under this heading. The contents of every wagon are sampled before delivery of the contents is accepted, and for this purpose the barley trains are worked through from Dixie Exchange Sidings or marshalled from Shobnall to the firm's Klondyke Sidings. Here they remain until released by the Malting Department.

4. *Cooperage.*—Wagon loads of returned empty casks are dealt with as they arrive at the Exchange Sidings. Trains are made up and the casks delivered to the cooperage washing plants for sterilisation and repair.

5. *Hop Department.*—The whole of this traffic is delivered in covered vans, and immediate transmission from rails to stores is effected on account of the perishable nature of the hops.

6. *Coal.*—Coal is required by every department of the brewery, and is accepted as received for ultimate distribution over the whole system.

7. *Oddments.*—Oddments include wagons consigned to departments not already mentioned, the chief of which are the Engineering and General Stores Departments.

INTERNAL TRAFFIC.

1.	Breweries ..	(Maltings to breweries).
2.	Grain department	(Barley to maltings).
3.	Cooperage ..	(Casks to breweries).

1. *Breweries.*—The differentiation between these trains and those already referred to under the previous heading is that the malt has to be transferred from garners on the premises, whereas the former was traffic exchanged from the L.M.S. and L.N.E. Companies. Consistent punctuality is maintained by means of "trip trains," which have a scheduled time-table, and only stop to set down at any of the three breweries.

TIME-TABLE.

MALT "TRIP TRAINS."

		a.m.	a.m.	p.m.	p.m.
Shobnall (Maltings or Exchange Sidings)	dep.	9.0	11.0	12.45	2.0
New Brewery ..	arr.	9.10	11.10	12.55	2.10
Middle Brewery ..	dep.	9.25	11.25	1.10	2.25
Old Brewery ..	arr.	9.35	11.35	1.20	2.35

Including time allowed for setting down and shunting into the brewery docks.

2. *Grain Department.*—Upon arrival of the barley at "Klondyke" Sidings, the Malting Department becomes responsible for the sampling of the wagons, on the completion of which they are ordered forward to the malthouses at which required.

3. *Cooperage.*—These trains are composed of clean casks travelling from the cleaning plants to the breweries for refilling with ale. They run three or more times daily to each brewery as required.

DEPARTURE TRAFFIC.

"*Bass Specials.*" — Special express trains to different parts of the country leave at appointed times each day with loads of from 40 to 50 wagons.

Strict punctuality is adhered to in their despatch from the Brewery loading stations, and to that end, therefore, the same punctuality of exchange with the Railway Company is observed. The promptitude with which this is uniformly maintained is evidence of the efficiency which is associated with traffic manipulation.

The "Scotch Special."—One of the most important of these particular trains is the "Scotch Special," which runs three times weekly. This train runs through from Burton to Leeds, where the engines are

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DIXIE ALE-LOADING STATION.

EMPTY CASK BANK, MIDDLE YARD.

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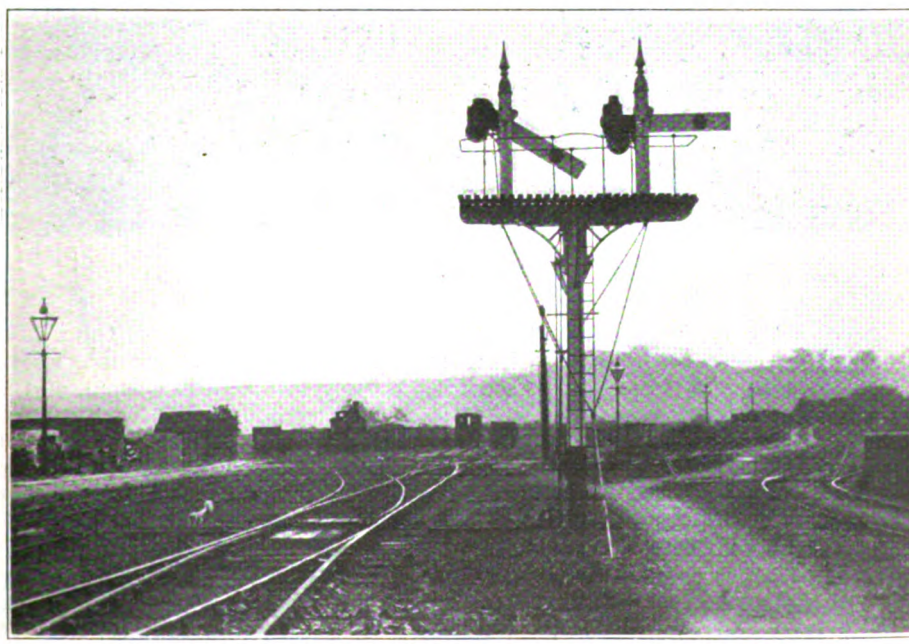
SHOBNALL ALE-LOADING STATION.



KLONDYKE SIDINGS, SHOBNALL

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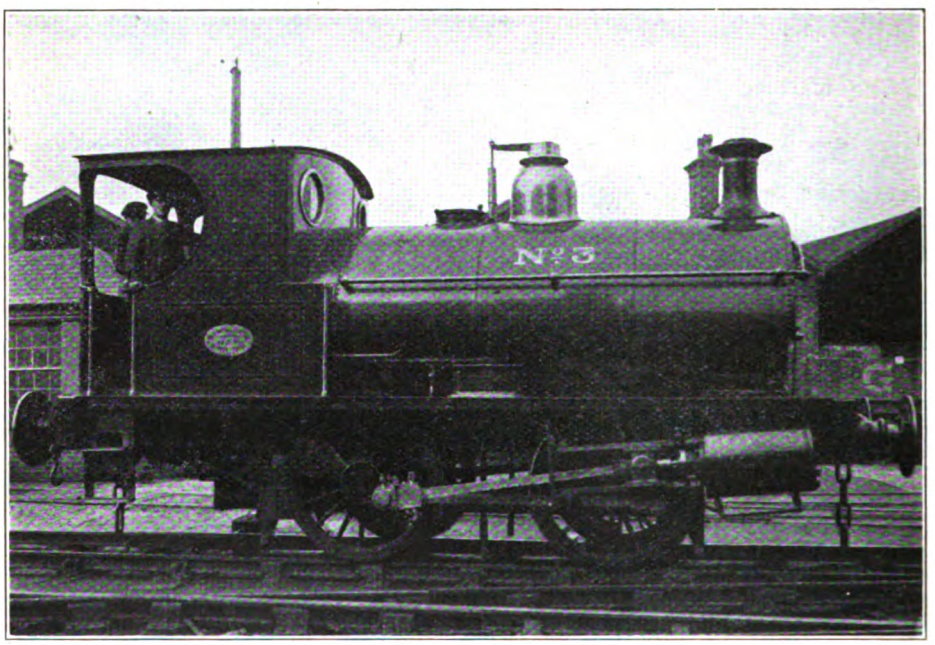
changed, and then goes forward without a stop to Carlisle. Upon arrival at the latter point connections are waiting to take the traffic forward to the various destinations, where in the majority of cases, delivery is effected upon the day following despatch from the Brewery.

During the course of our visit some of these trains were then in the process of despatch to the exchange sidings (including the "Scotch Special," of which a photographic illustration appears on page 99). The sight of these heavily laden trains steaming past was reminiscent of the passage of goods traffic on a main line railway. It might be added that it is probably unique that a freight train of such a magnitude covering so extensive a distance should regularly be despatched thrice weekly by one firm of senders.

Train loads of grains and hops which have been used in the breweries are despatched to manufacturers of cattle and pig foods. This, again, is perishable traffic which requires immediate handling. It may be pointed out that, except for purely local distribution, all traffic to or from Bass and Company's premises is operated by rail.

There are 11 distinct services in daily circulation, connecting the business of one department with another, and in co-operation with the L.M.S. and L.N.E. Companies. With two Exchange sidings, one at each end of the brewery premises, the arrival—and in the same way the departure—traffic is not working in one direction, but in two at various points over a single line, making it impossible to keep the main roads open without efficient control. The busiest line on the system is the single line running from the engine shed junction to Duke Street, and it is here that the Head Control Office is situated. This office is responsible for train working over the entire system, and is in telephonic communication with sub-offices at Dixie and Shobnall. The two latter are directly responsible for administration at the exchange at which they are situated, and subject to the Head Control for all matters appertaining to trains travelling over the private lines. The Head Control is in communication with every department served by the railway, and deals with any special requirements and irregularities which may occur. And, lastly, it is always in close and direct contact



REBUILT CLASS "B" LOCOMOTIVE.

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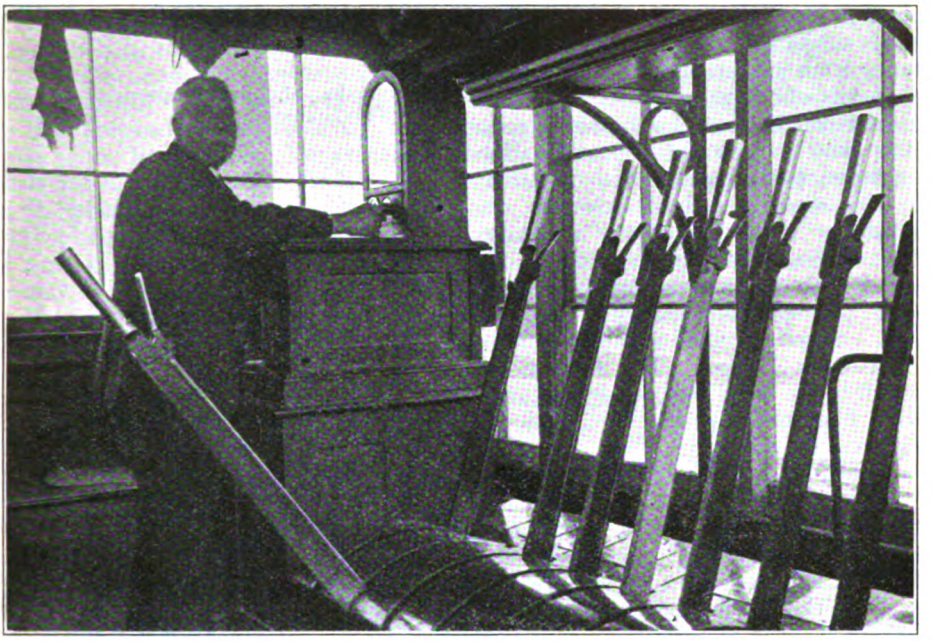
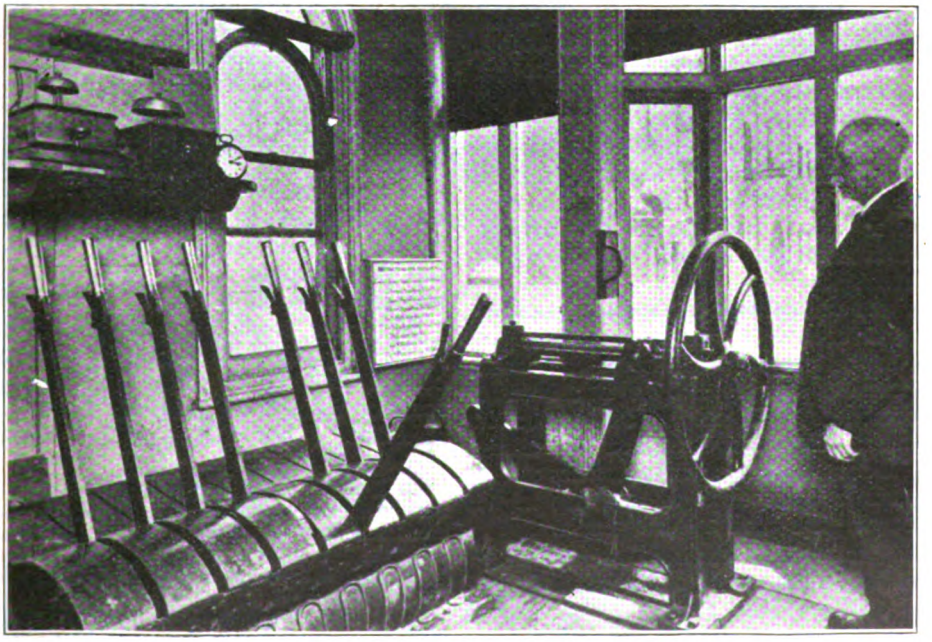


SHOBNALL SIDINGS SIGNAL-BOX, SHOWING ELECTRIC TABLET INSTRUMENT.



SIGNAL-BOX AT STATION STREET LEVEL CROSSING.

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with the L.M.S. and L.N.E. Railway Companies.

Trains proceeding over the firm's private lines are subject to the control of signals operated from private boxes, and in sections where running powers are in existence they are under the control of L.M.S. signals. Electric and telephonic communication exists from one signal-box to another, while the recognised bell code for the "admittance" and "rejection" of trains is in use. Railway crossings over the public streets and thoroughfares throughout the brewery premises are guarded by both "home" signals and "semaphores" of the "crossbar" type. The former are pulled off in the usual way, while the latter revolve like the "poteaux" used on Continental railways.

The convenience of the public is studied with a view to minimising the delay caused by trains crossing the streets. A book is kept by the signalman in charge of the gates in which movement of engines and trains over the public thoroughfare is recorded. The time allowed is one minute, but if the delay exceeds two minutes the causes are investigated by the Control. In the few cases when this has been necessary it has been found that the delay has been due either to an engine "slipping" in frosty weather or to the presence of fog. The number of wagons allowed to be drawn across the streets on any one journey is also limited.

The firm owns a large number of private vehicles both for internal work and for the conveyance of coal from the local collieries. There is also a private saloon carriage which is used for carrying visitors round the breweries.

At the stores and ale-loading stations there is always a constant amount of shunting in progress. Hitherto this work was carried out by horses, but is now performed at the busiest points by electric capstans. Horses are limited to pulling one loaded wagon, or two empties; the capstans are capable of moving eight loaded wagons and twelve empties.

The following example shows the scheduled trains arranged for an ordinary day's work :—

Clean casks, Middle Yard cooperage to Middle Brewery.	8	0	a.m.
	10	0	,,
	12	0	noon.
Clean casks, Shobnall cooperage to Middle Brewery.	7	40	a.m.
	9	30	,,
	11	15	,,
	2	15	p.m.
Clean casks, Shobnall cooperage to New Brewery.	7	40	a.m.
	8	15	,,
	10	15	,,
	11	30	,,
	12	30	p.m.
	2	45	,,
Ale from New Brewery to Shobnall Ale-loading Station.	8	40	a.m.
	10	40	,,
	11	50	,,
	1	10	p.m.
	3	5	,,
Ale from Old Brewery to Dixie Ale-loading Station.	7	30	a.m.
	10	30	,,
	1	0	p.m.
	2	30	,,
	5	0	,,
Malt trips from Shobnall to Middle and New Breweries.	9	0	a.m.
	11	0	,,
	1	0	p.m.
	2	30	,,

Speaking generally, it may be said that all of these are required to meet the needs of a normal day's working, and that any modifications will be in the nature of additions as arranged by the Control Office.

The firm's book of Rules and Regulations is based on those recognised by the L.M.S. Railway Company. They thereby conform to instructions which have to be carried out by the firm's trains travelling over jointly worked portions of the line. There are also Bass & Co.'s working regulations and special instructions which refer to particular portions of the firm's lines.

As showing the necessity for promptitude of the scheduled services, it may be stated that at a number of these places there are technical workers waiting for the arrivals of the various traffics, delay to which, therefore, would cause dislocation and wastage of working time.

Naturally, traffic on so large a scale has to be organised systematically, and a certain number of forms and returns—some of them of a specialised nature—are essential. A few of these are as follows :—

(1) Empty wagon requisition.

(2) Loading slips to foremen ale-loaders for each consignment and destination, giving loading times, location of consignment in store rooms, &c.

(3) Daily statement of racking and forwarding at each brewery.

(4) Return of coke, coal and dust standing in wagon.

(5) Daily return of wagons (other than under four) standing under load.

(6) "Due Away Loaded" card.

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The purposes of the returns (1) (2) are to give the loading staff instructions as to the loading of wagons; advices to the L.M.S. and L.N.E. companies as to empty wagons called for, and as to the destination of loaded wagons. The instructions to loaders are prepared in advance by the Invoicing and Forwarding Department and distributed through the Traffic Department, which is, of course, in close and direct touch not only with the L.M.S. and L.N.E. staffs, but also with all sections of the brewery premises. In large measure traffic is handed over by schedule trip trains to the L.M.S. and L.N.E. companies marshalled and with wagons in junction order, whereby connection with and prompt despatch of the booked outward services is facilitated. Wherever there is an overplus or a shortage of wagons the services of the Control Office are at once enlisted, and steps are taken to meet the emergency before congestion can arise. A return is prepared each morning giving, on a classified basis, particulars of every wagon standing on brewery premises or Exchange sidings. This system results in the practical elimination of demurrage.

First thing each morning in the offices of the Traffic Department the operation of the previous day's working is closely studied; and in the event of any traffic delay arising, particularly the missing of an outward service owing to delay in reaching the Exchange sidings, or other untoward circumstances, the matter is immediately followed up. Speaking generally, however, we understand that this is but seldom, and that, as a rule, traffic is operated with almost absolute punctuality. Signal cabins are in telephonic communication with one another, as well as with the Control Office, and in cases where a section of single "through traffic" line is concerned, the movements of trains in one direction or the other are controlled after the exchange of telephonic messages between the signalmen at each end.

DEPARTURE OF THE SCOTCH SPECIAL.

The first engine owned by Bass, Ratcliff & Gretton was a "square-top-tank" engine built by Thornewill & Warham, of Burton-on-Trent, and delivered in 1861. The second engine, delivered in 1863, and known as No. 224, was constructed by the same builders, but had many features suggestive of main-line practice of the period. Thus, it had an ornamental dome, with Salter safety valves, and, although a 0-4-0 tank engine, had the water tanks so well hidden by the frame that it was not immediately apparent that it was not designed to run with a separate tender.

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Wood-faced buffers were subsequently added to this engine, so as to increase the area and thus prevent "locking" on sharp curves. For the same reason the modern engines present a somewhat peculiar appearance because of the very large size of their buffer faces. In 1864 two more engines, generally similar to No. 224, and known as Nos. 1 and 2, were added. Nos. 3 and 4, of a larger size, which were fitted with underneath tanks, were placed in service in 1869 and 1872, respectively, while between 1873 and 1877 were added Nos. 5, 6, 7, 8 and 9, of the "Faery" class. Of these engines, which were also constructed by Thornewill and Warham, Nos. 5 and 8 were taken by the Government during the war; Nos. 6 and 9 have been scrapped; while No. 7 has been rebuilt and is still in service.

Then came two engines, known as the "Triangle" class, one built in 1880 and the other in 1890. With these engines the underneath tanks disappeared and certain other changes were made. The former has been scrapped, but the latter—now No. 3—was rebuilt in 1909 and again in 1924, and is still in commission. The present locomotive stock consists of Nos. 1 (1900), 2 (1900), 4 (1913), 9 (1901), 10 (1899), and 11 (1899), built by the North British Locomotive Co. Ltd., of Glasgow, to the designs of the Chief Engineer to the Company; together with Nos. 3 and 7 already referred to. The former series of engines is known as Class "A" and the latter two as Class "B." Class "A" engines have 14-in. by 21-in. cylinders, 3-ft. 6-in. wheels, wheelbase 6 ft. 6 in.; steam pressure, 135 lb. per sq. in.; and weigh, unloaded, 23½ tons. Class "B" engines have 14-in. by 20-in. cylinders, 4-ft. wheels, 6-ft. 3-in. wheelbase, 120 lb. steam pressure and weigh 22¼ tons.

EXCHANGE SIDINGS, DIXIE.

All engines are now finished in a neat and attractive style, painted bright red, with brass domes and copper-capped chimneys. They are capable of hauling loads of 30 to 40 loaded wagons, notwithstanding that in places the gradients are by no means easy. The Railway Department staff includes sidings foremen, locomotive drivers and firemen-cleaners, head and under shunters, numbertakers, signalmen, capstanmen, pointsmen and crossingmen, together with clerical and other staff. The firm have their own permanent way

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and engineering staff, and the periodical dismantling and overhauling of the locomotives is undertaken in their own locomotive shops. At exceptional points a little horse shunting is still carried on, horses and men being associated with the Traffic Department while thus engaged.

Considerations of space preclude us from enlarging more fully upon the scope of Bass & Co.'s railway system, and of necessity we have confined our description to salient features. During the progress of our inspection, however, the impression was formed upon us that here was a great railway system with elaborate and complicated ramifications over which a daily and very heavy traffic was being operated "according to plan" in a highly efficient and effective manner, and with evidence of carefully designed and skilful movement.

At each of the various places we visited the traffic was moving quietly and smoothly, and it was difficult to realise that, at the conclusion of a current day's work, a thousand wagons or more had each been moved to and from its allotted place; booked "specials" loaded and despatched to various parts of the country; and the numerous requirements of the various Departments, many of them of an intricate nature, each and all duly provided for. This article would, we think, be incomplete without reference to the saloon trip over the firm's entire railway system, which is much appreciated by parties of visitors to the brewery. This trip occupies upwards of one hour, and enables one to appreciate the magnitude of the premises at which the world-famous "Bass" is brewed.

In conclusion, we may express our indebtedness to Bass, Ratcliff & Gretton Ltd., for facilities for inspecting their railway system and studying the methods of railway operation, and to Mr. F. Haynes, the company's Traffic Manager, who joined the staff of Bass & Co. in the early part of 1915. He received a wide and extensive railway training in every branch upon the late Midland Railway, eventually becoming the resident Assistant District Goods Manager and Chief of that company's Agents at Liverpool, including the Sandon & Canada, and Alexandra and Langton Docks Stations; the Victoria Street Reception Depot and the Agencies at Huskisson, Brunswick and Birkenhead, before he was appointed to take charge of Bass & Co.'s railway system at Burton-on-Trent.

THE Second Part and Completion of "Indicator's" Article on

"CLYDE RAIL AND STEAMER SERVICES"

is unavoidably held over until the March Number.

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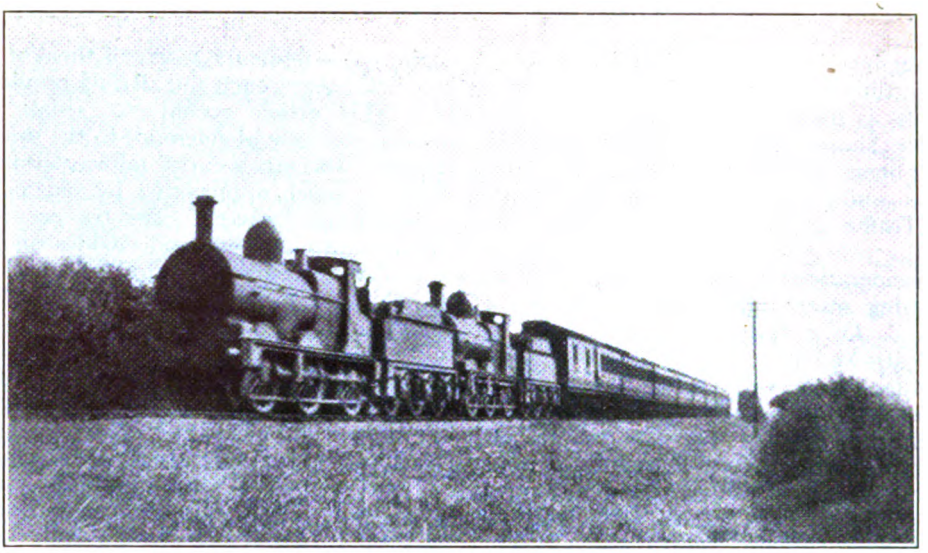

Photo.] [*I. A. Higgon.*

7.55 A.M. EX PWLLHELI LEAVING BARMOUTH JUNCTION.
0-6-0 locomotives Nos. 2545 and 2476.

Special Traffic Working on the Cambrian Coast Section, G.W.R.

By IFOR A. HIGGON.

THE holding of the Royal National Eisteddfod of Wales at Pwllheli, from Monday, August 3, to Saturday, August 8, naturally added considerably to the already heavy summer traffic over the Cambrian Coast section of the late Cambrian Railways, now part of the Great Western system.

This section, extending from Machynlleth to Pwllheli, is 57¾ miles in length, and is single track throughout, though the doubling of a portion of it from Dovey Junction to Machynlleth, a distance of four miles, is in progress. At the latter place are situated the locomotive sheds and carriage department serving the section.

From Dovey Junction, where a connection is made with the late Cambrian main line (from Aberystwyth to Whitchurch) to Pwllheli, the railway runs practically parallel with the coast-line, and is never more than a few miles from it. At Barmouth Junction, 24 miles from Machynlleth and where the Central Wales and Chester Divisions meet, there is a junction with the Ruabon branch, and at Afonwen, 4½ miles from Pwllheli, with the L.M.S. Railway (old L. & N.W. Railway).

During the summer through carriages were run from Paddington, Manchester (Exchange) and Birkenhead to Pwllheli, via Ruabon, and from Paddington to Barmouth, via Welshpool and Machynlleth, with corresponding return services. The fastest trains were those conveying the through coaches. In the up direction, *i.e.*, from Pwllheli, the best train was the 8.50 a.m., which conveyed through portions to Birkenhead and Paddington. This train was allowed 70 min. (excluding four stops) for the 32·2 miles to Barmouth. A through train for Birkenhead and Manchester (Exchange) left at 10.25 a.m., and at 11.55 a.m. one with through coaches to Paddington.

From Barmouth to Ruabon (Chester Division) and vice versa, all trains were exclusively worked by Chester Division engines of the 23, 24 and 25XX, 0-6-0 classes, and the 3201-4 and 3501, 2-4-0 classes.

The Barmouth to Paddington portions

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left at 9.20 a.m. and 10.20 a.m., both connecting with main line trains at Dovey Junction, and travelling via Welshpool and Shrewsbury. The 10.20 a.m. always consists of three standard elliptically roofed G.W.R. carriages, which were attached at Dovey Junction to four (usually of the same kind) on the 11.0 a.m. restaurant train, ex Aberystwyth to Paddington. The principal fast trains on the main line were worked by "Duke" class 4-4-0, twenty of which have been at work, by "Barnum" class 2-4-0 (eleven), and by the four ex Cambrian Railways 4-4-0's, Nos. 94 and 96 to 98 (G.W.R. Nos. 1014, 1029 1035 and 1043), which have been painted and fitted with G.W.R. type safety valves.

The through coaches from Paddington to Pwllheli, via Ruabon, left at 9.10 a.m. and 11.10 a.m. respectively, and for Barmouth, via Welshpool, at 6.30 a.m. and 10.10 a.m., Pwllheli was reached at 5.0 p.m. and 6.37 p.m., both trains having through portions from Birkenhead and the former an additional one from Manchester (Exchange) at 11.20 a.m. The latter train was the fastest on the line and took 64 min. (excluding four stops) from Barmouth to Pwllheli. The 10.10 a.m. ex Paddington was a luncheon and tea car train, exclusively serving the Cambrian Coast from Aberystwyth to Barmouth, arriving at the two places at 4.15 p.m. and 4.39 p.m. respectively.

SKETCH MAP SHOWING CAMBRIAN SECTION OF G.W.R.

During the National Eisteddfod week all trains were considerably augmented, the

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load being increased from the ordinary four or five coaches to a maximum load for the week of 64 wheels per train. This addition necessitated the use of two banking engines at Barmouth Junction, a pilot engine at Barmouth, and two banking and a pilot engine at Portmadoc. From Barmouth Junction to Towyn, 12 miles, there is a total distance of 2¾ miles at 1 in 60-75-82, up which even moderately heavy trains have to be assisted. The section from Barmouth to Portmadoc contains two stretches of ½ mile each at 1 in 75 near Barmouth, and two others of ½ mile each at 1 in 50 and 65 near Portmadoc. Between Portmadoc and Criccieth, out of a total of 5 miles, there are 2½ miles varying from 1 in 50 to 1 in 80, making necessary always to use two shunting and banking engines at the former place. For some time past these have been two ex Cambrian Railways 0-6-0's, Nos. 45 and 48, now G.W.R. Nos. 900 and 908. These are two out of a total of four still working of the first class of 0-6-0 type engines used on the Cambrian Railways, 21 of which were built by Sharp Stewart & Co. for that railway between 1861 and 1878, and which were of the type universal at the time. Both were rebuilt during the Cambrian era, but No. 900 has been again partly rebuilt, this time by the G.W.R. Co., at Swindon in October, 1923. It has a new smokebox, chimney, dome, safety valves and firebox fittings in cab, but has its own boiler, raised firebox, cab and motion, etc.

A point of interest about this engine is the tender. This is four-wheeled and contains 1,439 gallons of water and is the only one on the line. It has raised outside springs and has a toolbox on the buffer beam extending the whole width of it. No. 908, 0-6-0, is also of interest as it is the only one of the Sharp 0-6-0 engines as rebuilt by the Cambrian Railways still working, the three others, Nos. 14, 45 and 51, G.W.R. Nos. 898, 900 and 910, having been rebuilt by the G.W.R. Co. at Swindon in 1923-4.

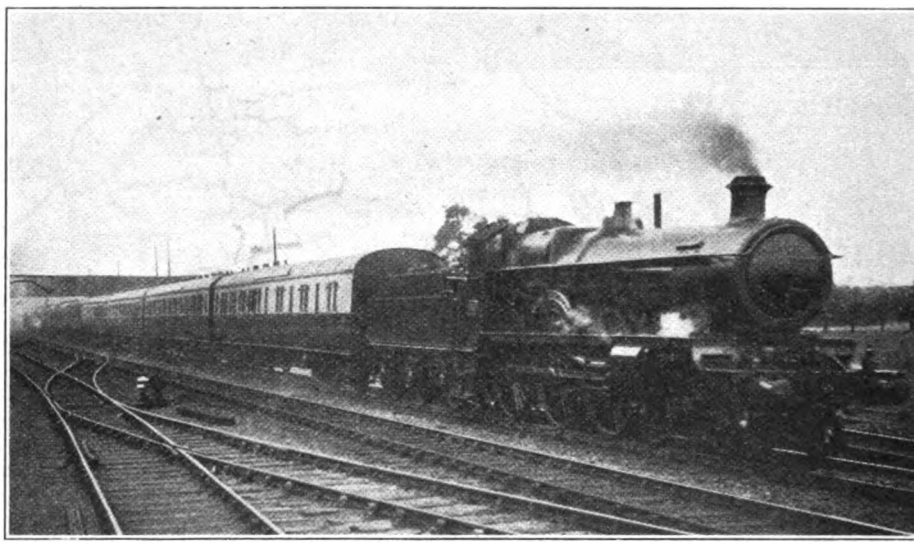

Photo.] [*H. L. Salmon.*

10.40 A.M. PADDINGTON-ABERYSTWYTH LUNCHEON AND TEA CAR EXPRESS, G.W.R.

4-6-0 locomotive No. 4030, "King Harold."

The pilot engine at Portmadoc for the week was G.W.R. No. 1329, 2-4-0, ex Cambrian Railways, No. 1. The latter company bought this engine, together with a somewhat similar one, No. 1328, from the G.W.R. in March, 1921, and numbered them 1 and 10. Both have been working on the coast section since then and are now veterans of 42 years. They still retain their old six-wheeled tenders, with raised outside springs, containing 2,072 gallons of water, the numbers being 194 and 288 respectively. No. 1328 is the only G.W.R.-built passen-

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ger tender engine with a round top firebox still in use on the Great Western Railway. The two additional banking engines at Portmadoc were G.W.R. 0-6-0's, Nos. 2451 and 2553. No. 2322, 0-6-0, was pilot engine at Barmouth and Nos. 2531 and 2545, 0-6-0's, at Barmouth Junction until Wednesday, and No. 3506, 2-4-0, until Saturday.

The passenger service on the Cambrian coast is worked mainly by G.W.R. engines of the 2-4-0 and 0-6-0 tender types. Certain bridges and the small length (45 ft.) of the turntable at Afonwen do not permit of any longer and heavier G.W.R. types being used except the 35 XX class 4-4-0's, though in November, 1924, a branch line 2-6-2T No. 4528, was on trial. But this class as yet has not started working on the late Cambrian Railways. The following 2-4-0 engines have appeared since 1922: "Barnum" class, Nos. 3206-7, 3209, 3210, 3212-3, 3215-7 and 3224; Nos. 3201-4, 3501, 3503, 3505, 3507-8, 3510-2, 3514 and 3518-9, the latter class having mostly small tenders (2,000 gallons), and Nos. 3232, 3239, 3241 and 4-4-0's Nos. 3521, 3542, 3544, and 3546. No. 810, 2-4-0, once worked a divisional engineers' coach to Barmouth from Shrewsbury. This engine was built in 1873 by J. Armstrong, and is the only one of the 18 built still at work. It has been rebuilt to correspond with the "Q" class (3232 class) 2-4-0's.

The goods service has been worked by 0-6-0's of the 23, 24 and 35 XX class, together with G.W.R. Nos. 844 and 881, ex Cambrian Railways 0-6-0's Nos. 15 and 78. For the past year the morning fast goods from Machynlleth to Portmadoc has been worked by the Cambrian Railways Belpaire 0-6-0 No. 15, built in 1918 by Beyer, Peacock & Co., Manchester, and developing 18,628·0 lb. tractive effort at 85 per cent. boiler pressure. This engine is painted G.W.R. colours and, together with most of the Cambrian engines, is fitted with G.W.R. safety valves. The other 0-6-0, G.W.R. No. 881, was originally built in 1895 by the Vulcan Foundry but has been rebuilt at Swindon in September, 1923, with a G.W.R. standard boiler, smokebox, Belpaire firebox, safety valves, cab fittings and a crosshead worked vacuum pump. G.W.R. No. 3521 4-4-0 bought with No. 3546 of the same type in July and August, 1921, to replace Cambrian Railways Nos. 82 and 95, destroyed in the Abermule smash of January, 1921, has also been for some time working on goods trains on the coast.

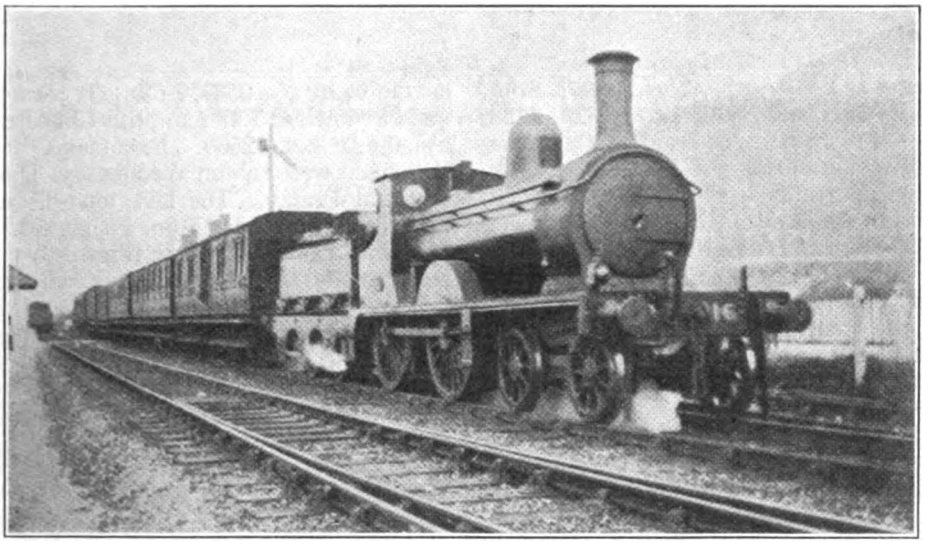

Photo.] [*C. W. Allan.*

BARMOUTH-MACHYNLLETH TRAIN LEAVING ABERDOVEY, G.W.R.

Cambrian 4-4-0 locomotive No. 16.

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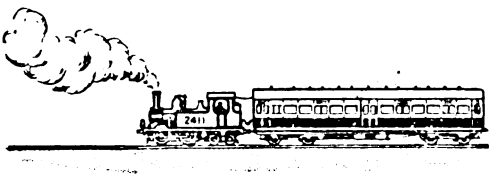
At the present time only one Cambrian 4-4-0 type passenger engine is at work. This is G.W.R. No. 1090, ex Cambrian Railways No. 62, which has been painted and fitted with new safety valves. Last summer a sister engine, No. 1100, ex Cambrian Railways No. 67, was also working regularly. There are also two tank engines of the 0-4-4 type, the only tank engines on the section. These are G.W.R. Nos. 10 and 19. Ex Cambrian Railways Nos. 3 and 8 both having but recently returned from Swindon after having a new smokebox, chimney, safety valves and cab fittings fitted, and painted G.W.R. colours.

From August 3 to 8 the majority of the trains were worked by 0-6-0 locomotives, though the following were also running: 2-4-0 type, Nos. 3207, 3210, 3215-6, 3501 and 3506, 1328, 1329, 3232, and 4-4-0, 3521. As regards the additional traffic during the Eisteddfod week, 68 special trains were run to Pwllheli, 31 from the L.M.S. line via Afonwen and 37 from the G.W.R. line. Each train was numbered, the numbering starting afresh each morning from No. 1. There was one train number head board on the front of the engine and one train number poster at each end of the train. There were day excursions each day from Holyhead, Colwyn Bay, Rhyl and Bangor (twice daily) composed of twelve six-wheelers. On Tuesday an excursion from Blackburn and on Wednesday from Huddersfield were run.

On Monday, Tuesday, Thursday and Saturday there were special trains serving the Cambrian coast from Machynlleth, and on Wednesday and Friday from Newtown. In addition there was a relief train daily from Machynlleth at 10.20 a.m. All these trains were composed of eight standard G.W.R. eight-wheelers. The heaviest traffic was on the Wednesday. A day excursion from Blaenavon (Mon.) via Ruabon arrived at Pwllheli at 10.21 a.m. It consisted of eleven standard elliptically roofed corridor carriages (including two restaurant cars) in the new colours drawn from Ruabon by 0-6-0 No. 2532 (banked from Barmouth). This train returned at 9.0 p.m., the engine being No. 2431, 0-6-0. This was followed by one from Llandilo (via Aberystwyth), reaching Pwllheli at 11.30 a.m. and leaving at 10.5 p.m., composed of eight coaches hauled by No. 2389, 0-6-0. A third excursion from Blaengarw (via Mid Wales line) arrived at Pwllheli at 12.30 p.m. This was made up of two dining cars and six eight-wheeled carriages, the train engine being No. 2537, 0-6-0. It returned from Pwllheli at 7.45 p.m., this time drawn by 0-6-0 No. 2560. Excursions from Wrexham were run on Wednesday, Thursday and Friday. The last long-distance train came on Friday from Fishguard.

It was a restaurant car train drawn by No. 2346, 0-6-0, and consisted of two dining cars, one G.W.R. eight-wheeler and five Great Central eight-wheeled carriages, arriving at Pwllheli 11.30 a.m. and departing at 10.5 p.m. On the same evening a period excursion from Cardiff left at 9.30 p.m.

It may be of interest to add that an ex Brecon and Merthyr Railway 0-6-2T No. 20, G.W.R. No. 1677, has been stationed at Machynlleth shed for some time. It once worked along the coast and returned double-heading a goods train from Barmouth Junction to Towyn with a "Barnum" class 2-4-0, No. 3216 (domeless). Incidentally, No. 1677 is the first tank engine of the 0-6-2 type that has worked on the late Cambrian Railway.



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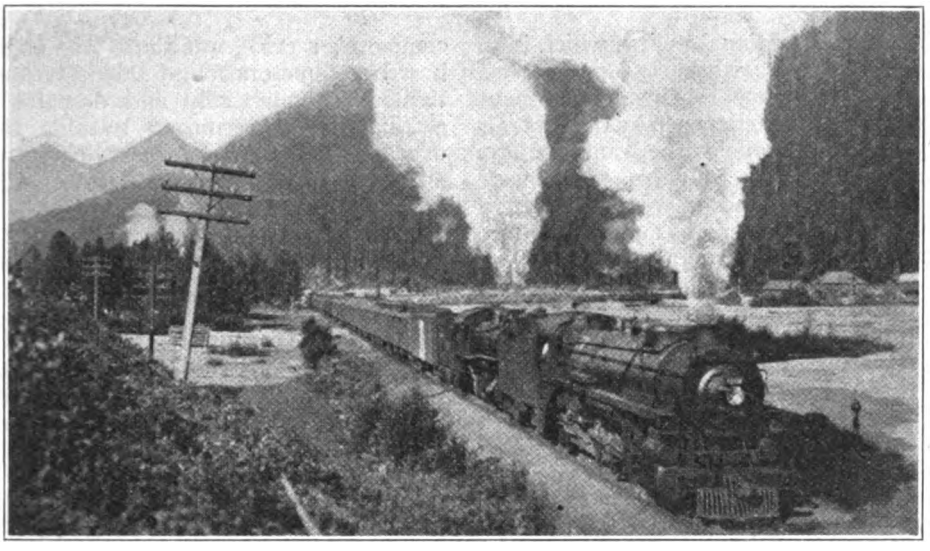

Photo.] VANCOUVER-TORONTO EXPRESS AT FIELD, B.C. [*C. R. Littlebury.*

C.P.R. Locomotives Nos. 5808 and 591.

The Romance of Canadian Railway Construction.

By SIR CHARLES PIERS, Bart.

THROUGHOUT the ages much has been written about the romance of war, but there is far more romance about the great struggle with Nature in railway and engineering construction. It may be that modern man is so accustomed to the wonderful engineering feats of the present day that he accepts such stupendous works as the Canadian Pacific Railway, without giving a thought to the trials, struggles, and achievements of its builders.

In a vast country like Canada railroads have to be built for the future, and for a long time many lines cannot be expected to be commercial successes. The financiers of such undertakings require great faith in their ultimate success, and there is little ground for comparison with projects for new railway construction in an old and settled country. Much has to be taken on trust ; it is, at times, only the firm belief of the promoters in the soundness of their enterprise that saves it from disaster. Even such a brilliant success as the Canadian Pacific Railway, during its construction, had its crises, mostly financial, from which it only escaped owing to the pluck and long-sighted vision of Lord Mountstephen and the sterling work of Sir William Van Horn. Had it not been for such men as these the railroad would not have been built when it was, from the Atlantic to the Pacific, across the Dominion.

It is old history, but perhaps not well known by the present generation, that the project was at first mainly political, and hinged on the stipulation made by British Columbia, when she consented to enter the Union in 1871," that a railway should be built across the Continent to give her access to the Atlantic Ocean." It was a great undertaking to bridge nearly 3,000 miles with the steel rails, but the Premier, Sir John MacDonald, a man of great determination, came to the conclusion that what would be for the good of British Columbia would also be to the profit of the rest of the Dominion, so he undertook to complete the railroad by the year 1881. Unfortunately he had not taken in sufficient account the want of

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consistency in national policy, which is so often associated with party Government, so when his Conservative government went out and was succeeded by the Liberals they did not uphold the same policy. Consequently four valuable years were practically lost, and it was not until a Conservative government again came into power that the construction of the railway was seriously pushed ahead.

Meantime British Columbia had threatened to break with the Federation. The Conservatives, however, soon satisfied her that they meant business by "calling for tenders for the completion of the line." A company was formed, which received from the Government "$25,000,000 in gold, and an equal number of acres of good prairie land," and the company was presented with "the 700 miles of partially completed track," as well as assistance in other ways. The Government, on its part, exacted that the railroad "should be opened for traffic in May, 1891," which meant that more than 250 miles must be laid every year.

By the terms of the contract the company's main asset was the land, but the value of the land depended on the value of the railway, so the company could not realise any profits until the line was constructed. The result, as described to me by a friend who was at the time in the company's service, was that "the original board of directors found themselves in a tight place financially and despaired of getting the Government to tide them over." The board had already pledged all their personal property and credit in order to keep the work going, so Lord Mountstephen wired to Donald A. Smith (afterwards Lord Strathcona) expressing fears that they would not be able to weather the storm. Sturdy old Donald Smith replied to this telegram with the one Gallic word "Craigellachie," which, if I am correct, interpreted means "Hold Fast," and they did, with the result that we now so fully appreciate.

C.P.R. TRAIN AT ALBERT CANYON.

My friend told me that at the time they were all about three months in arrears in their salaries. But such was the faith of the trading class in the future of the company that the grocers and butchers, he said, "who could not be paid, cheerfully stood up to it, told us to go ahead and get what we wanted—they would take their chance. If the Canadian Pacific failed the whole country was busted and they all would have to move out. Therefore they were willing to wait for their money." He told me he remembered that "after about the third month the paymaster came along with instructions to pay one month's back pay. One man, an American, refused to accept less than the

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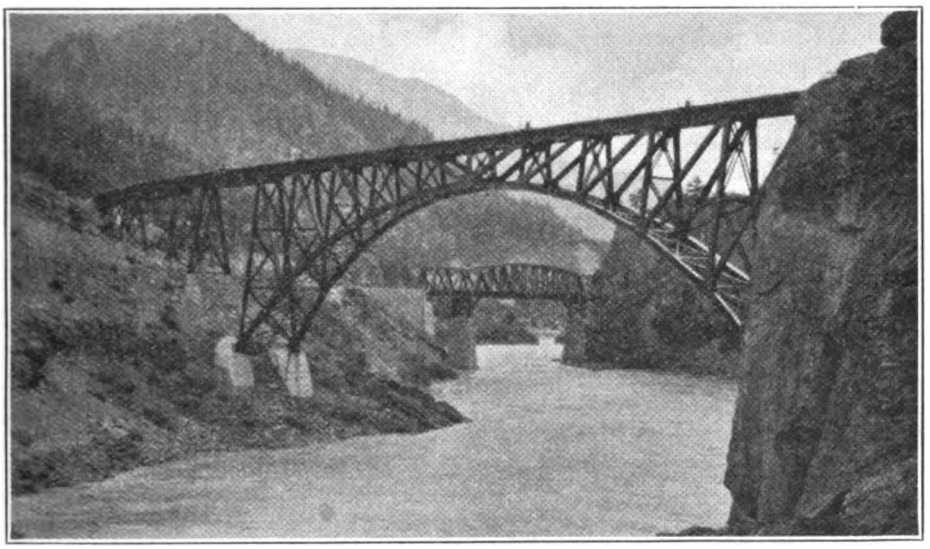
amount due to him. The head of his department was sent for and he advised the paymaster to give the man the full three months' pay, which was done. The man was sent for and dismissed the service with the statement that anyone who would not be prepared to play the game in a crisis like that would not be retained in the service, and he was advised to go back to the country he came from." "These," my friend remarked, "are trifling incidents, but they describe the sentiments of the people during those trying times."

It was a magnificent whole-hearted sentiment which materially assisted in the completion of the great work, and freed the employees of the company from the worries of daily existence, enabling them to devote all their energies to overcoming the mighty obstacles of Nature which confronted them. There is not only romance but grandeur in overcoming the passive opposition of Nature to the path of the railway builder. An opposition at times terribly dominant, in spite of its passiveness, and one which, like warfare, calls forth the best qualities in men, but never the worst, as is too often the case in war. What feat of railway construction can surpass the driving of the Canadian Pacific Railway through the vast mountain ranges from the prairies and the Pacific Coast, until the converging tracks met on that eventful November morning, 1885. Well may Lord Strathcona, with pride and satisfaction in the finish of work well done, have exclaimed in Gallic "Craigellachie" (Hold Fast) as he drove the last spike home. The historic place has been well named "Craigellachie," and the occasion of that memorable deed is best described in the words of the great engineer, Sir Sandford Fleming, who did so much to prospect the route of the railway.

"Early on the morning of November 7, hundreds of workmen gradually brought the two tracks nearer and nearer, and at nine o'clock the last rail was laid in its place to complete the railway connection from ocean to ocean. All that remained to finish the work was to drive home the last spike. This duty devolved on one of the four directors present, the senior in years and influence—he who is known the world over as Lord Strathcona. No one could on such an occasion more worthily represent the company by taking hold of the spike hammer and giving the finishing blows. It was indeed no ordinary occasion. The scene was in every respect noteworthy, from the groups which composed it and the circumstances which



C.P.R. AND C.N.R. BRIDGES, FRASER CANYON.

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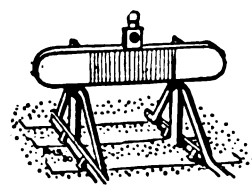
brought them together, so many human beings in this spot in the heart of the mountains, until recently an untracked solitude. The engineers, the workmen, everyone present, appeared deeply impressed by what was taking place. It was felt by all to be the moment of triumph. The central figure—the only one in action at the moment—was more than representative of the railway company. His presence recalled the memories of the Mackenzies, Frasers, Finlaysons, Thompsons, M'Leods, MacGillivrays, Stuarts, MacTavishes and M'Loughlins, who in past generations had penetrated the surrounding mountains. The spike driven home, the silence for a moment or two remained unbroken. It seemed as if the act now performed had worked a spell on all present. Each was absorbed in his own thoughts. The silence, however, was of short duration. The pent-up feelings found vent in a spontaneous cheer, the echoes of which will long be remembered in association with Craigellachie. In a few minutes the train was again in motion. It passed over the new-laid rails amid further cheering, and sped on its way, arriving the following morning at Port Moody, where a connection was made with the Pacific on November 8, 1885."

"The Luck of the Steel Rail" might well be an appropriate title for the description of some of our Canadian railways. Constructed, as I have said, for the future, with little prospect of paying until the country which they open up is settled and developed, their very construction has proved the means of bringing to light untold wealth, the existence of which was scarcely imagined. Such luck is spread all over the Dominion, and the possibilities of a railroad under construction are from day to day as alluring in our northern mineral districts, as those which compel the prospector to tramp the mountains in the everlasting search for gold. The construction of a branch line in Ontario from North Lake, Temiskaming, to connect the C.P.R. at North Bay with the important town of New Liskard, 125 miles to the north, proved a regular dip into the "lucky bag." It was an undertaking with no immediate prospects, and raised tremendous discussion and opposition. Little was known about the country through which the line would have to pass, and even to the wandering prospector it had given no sign of mineral wealth. It was sparsely settled, the soil was mostly clay, poor for agriculture, the timber was white pine, at that time a drug on the market, and its climate was severe. Altogether the outlook was most unpromising, but strings can be pulled in politics, so the Government had their way. Construction for the first hundred miles was through a district where innumerable small lakes had to be crossed or avoided, and rock cutting had to be made through hill after hill. Yet such was the luck of the undertaking that in one of the rock cuttings silver was found in such large quantities that an immediate rush into the country ensued, and later some prospectors discovered a gold-field as rich as any in the world. From the day that silver was found in that rock cutting, the railway has never had an idle day, and such is the traffic that on most of the trains in the busy seasons of the year standing room is even in demand.



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Locomotive and Train Working in the latter part of the 19th Century.

THE DUBLIN, WICKLOW & WEXFORD RAILWAY.—No. I.

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

MY account of the Dublin, Wicklow and Wexford Railway, as it was then called, will be divided into two main portions: the orthodox and the unorthodox, somewhat intermingled. The unorthodox is chiefly concerned with my own experiences of the line, in company with a certain O'Rourke, of whom more anon. Some of the orthodox portion partakes to a considerable extent of the nature of the Irish R.M.'s account of "Lisheen Races, Second-Hand," and for this, in addition to what I was enabled to see for myself, when O'Rourke did not interfere, I am indebted to several channels of information, ranging from the usual high-class sources down to the aforesaid O'Rourke, whose reliability on the subject of Irish railways, except in the matter of the guards and the quality of the stout in the refreshment rooms, was considerably attenuated and open, in spots, to very grave doubt.

In order to be on safe ground I will open with the orthodox and present as a curtain-raiser a mild and harmless tabloid history of the line derived from unimpeachable sources. The infallibility of this portion of my story may therefore be taken as unassailable.

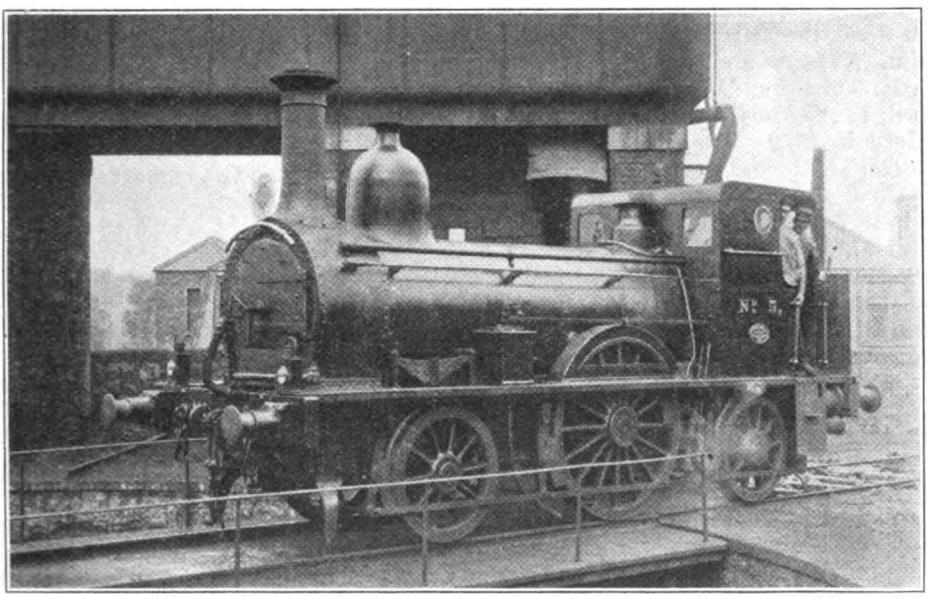

Photo.] 2-2-2 TANK ENGINE No. 5A. [*Loco. Publishing Co. Ltd.*

Built by Fairbairn & Sons in 1854. Rebuilt by D.W. & W.R.

The earliest portion of the line was the Dublin and Kingstown Railway, originally made on the 4 ft. 8½ in. gauge, and opened in 1834. O'Rourke darkly hinted that it dated back to Brian Boru, but I think that both his chronology and topography were somewhat confused. From Kingstown an extension was subsequently made to Dalkey, which for a time was worked on the atmospheric system. The atmospherics proved troublesome, and shortly afterwards the line was switched

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on to steam, and at a later date, about 1855, the gauge of the whole railway was altered to the Irish standard of 5 ft. 3 in. I should add that the Dublin and Kingstown line, which had its Dublin terminus at Westland Row, was an independent railway, and had no physical connection at that time with the Dublin and Wicklow Railway. The latter company was opened to Wicklow in 1856, its terminal station in Dublin being further west, at Harcourt Street, though the original line started from Dundrum. In July, 1856, the Dublin and Wicklow Railway leased the Dublin and Kingstown line, and shortly afterwards the connecting link between Dalkey and a junction near Bray was made. From 1860 the title was altered to the Dublin, Wicklow and Wexford Railway, and the extension beyond Wicklow was opened to Enniscorthy in 1864 and to Wexford in 1872. The branch line from Woodenbridge to Shillelagh dates from 1863, and that from Macmine Junction to Palace East in 1866. The latter seems to have been part of an older derelict line known as the Bagenalstown and Wexford Railway, which began nowhere and finished somewhere else. This section was extended to New Ross in 1890, but the further extension to Waterford was not completed until 1904, after which, in January, 1907, the railway took unto itself the new name "Dublin and South Eastern."

In 1891 the Dublin and Kingstown section was extended from Westland Row station northwards to Amiens Street, where a junction was made with the Great Northern. The new line was known as the City of Dublin Junction Railway, and had the advantage of providing connections which had not hitherto existed with the Great Southern and Western and the Midland Great Western Railways. Hitherto, the Dublin, Wicklow and Wexford Railway had been almost completely isolated from the other leading railways of Ireland, except for an end-on connection with the G.S. and W. at Palace East, in the wilds of Wexford, which was of no use to anybody.

The D.W. and W.R. fixed its locomotive headquarters at the old Grand Canal Street works of the Dublin and Kingstown Railway.

From Merrion, near Dublin, on the Kingstown line, the railway follows the coast closely as far as Wicklow, after which, with the exception of a bend outwards at Arklow, it keeps inland. As regards beautiful views over the sea the coast line has many advantages, but these are considerably discounted by the effects of sea erosion at various points on the railway.

The unorthodox portions of my story begin, not in Ireland, but on this side of the Channel, where I first became acquainted with Thomas Joseph O'Rourke, of whom I will at once state that his real name was something else, and for divers reasons must remain concealed. His father was a well-known Dublin citizen, a friend of John Redmond, and I should also add, a most delightful and hospitable Irishman. My friend was studying engineering in England, and for two years he and I shared a sitting room in common at our "diggings," in which we frequently argued Gladstone's Home Rule Bill from top to bottom, on one occasion nearly coming to blows at the breakfast table with a couple of table-spoons. At such times, or when he became somewhat excited, his speech developed a glorious Irish brogue, not unduly apparent on ordinary occasions.

His home was just outside Dublin on the D.W. and W. Railway, and one of the causes which led up to my first acquaintance with this and other Irish railways was a visit which O'Rourke paid to Leeds, at the start of which a mutual friend carefully saw him off at King's Cross. A few days afterwards I happened to be at the Midland station at Sheffield, as an express from the North to London was standing at the platform. Two perplexed-looking ticket collectors were standing at the open door of one of the compartments (there were no corridor trains then), and as something out of the ordinary seemed to be occurring I strolled up. A brogue, which I at once recognised, was issuing from the depths of the compartment and announcing with considerable emphasis:—"Divil a bit am I going to get out of it. Ye ought to have sor-rted your railways out properly and it's not my affair if ye haven't." At this point I made my presence known, and enquired what the trouble was. "Is that you?" came from the carriage, "it's the divil of a mess they're in." The principal

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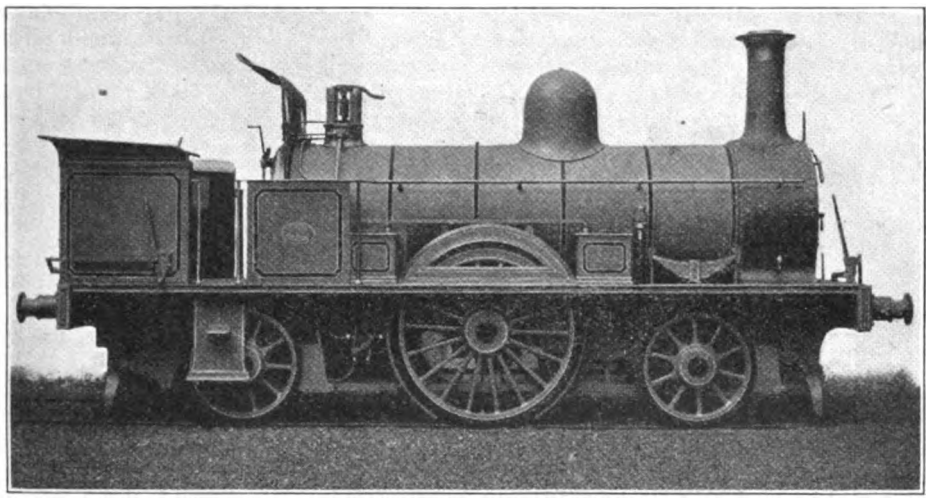
collector, whom I had known well for some years, looked greatly relieved on hearing that the passenger was a friend of mine, and explained that the latter had a Great Northern return ticket from Leeds to London, which naturally was not available on the Midland. I went bail with names and addresses and the Irishman was allowed to continue his journey armed with a voucher.

Shortly afterwards O'Rourke's father came down for a few days to our rooms, and expressed his thanks to me for helping to look after Tom, at which the latter, who was standing behind him, winked with a ferocity that would have done credit to a pirate. "I hear," he added, "that you helped to get him out of trouble on his journey from Leeds. When your summer holidays come, you must come over and spend a week or two with us in Dublin, and Tom will go round with you to show the sights." "By all means," said my friend, "but you don't know him as well as I do. Sights of Dublin, faith! he'll spend all his time at the stations, and in the engine sheds, and he'll want to go to Inchicore and Broadstone and a lot of other such-like places, and on the last afternoon before he goes back he'll just begin to find out that he is in Ireland, let alone Dublin, and somebody will have to shake him up before he discovers that at all. It's a power of good it'll do him to keep his nose outside an engine shed; we get enough of them here."

This boded little good for the Dublin, Wicklow and Wexford, and other railways, but I took it lying down, and six weeks later found myself at North Wall, thereby incurring O'Rourke's deep displeasure for not having come by the mail boat *Ireland* to Kingstown. Having delivered his soul of this, he added: "It's the devil's good luck ye've got; my aunt from Athone is coming to-morrow." I expressed myself suitably in anticipation. "Oh! it's not that," he retorted, "The old lady is only coming for two days, and as she always insists on me going round with her for one of them, you'll be free for your engine sheds that day, anyway." Needless to say, I made the most of it, and for my kindness in handing the guardianship of O'Rourke over to her, his rôle being to carry the results of her shopping, I was rewarded with a cordial invitation to come down with him and spend the next week-end in mid-Ireland. "But this is another story," and therefore I return to my investigations on the Dublin, Wicklow and Wexford Railway, beginning with the locomotives as they then were.



2-2-2 TANK ENGINE No. 34.

Built by Neilson & Co. Ltd. in 1873. Driving wheels 5 ft. 6 in. diam. Cylinders 15 in. by 20 in.

For the numerous local and suburban trains between Dublin and Bray two quite

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different classes of engine were used. The first were 2-2-2 tank engines with single driving wheels, and were of a design with inside frames, which was almost peculiar to Ireland and extremely rare on this side of the Channel. Their chief characteristics were that the bearings of all three axles were inside the frames, and the well tanks were placed underneath the coal bunker at the back. The type on the Dublin, Wicklow and Wexford Railway originated in 1854 with two small engines, Nos. 4 and 5, by W. Fairbairn & Sons, followed by Nos. 6, 7, 10 and 11 in 1855, by the Vulcan Foundry. All were built for the Dublin and Wicklow Railway local trains, but the Vulcan engines had long saddle tanks and domeless boilers. Their driving wheels were 5 ft. 3 in. diam. and the cylinders were only 13 in. by 20 in. The original valve gear of the Vulcan engines was of the Dodds wedge motion type, in which a single eccentric only was used for fore and back gear. To reverse the engine this was moved across the crank axle by means of wedges actuated by a system of levers attached to a shaft which terminated at the footplate, and the reversing lever, instead of being moved in the usual direction longitudinally, was pulled transversely. Brake blocks on the small trailing wheels only were provided.

The later well-tank engines had 5 ft. 6 in. driving wheels, and began with a series built by Neilson & Co. in 1865, with 14 in. by 20 in. cylinders, and there were two somewhat more modern-looking engines, Nos. 34 and 35, by the same firm in 1873. Others of similar dimensions, Nos. 29 to 31, 36 and 40, bore date-plates from 1871 to 1880, from which it appeared that they had been built at the company's Grand Canal Street Works. One or two of the latter originally had stove-pipe chimneys of the old Caledonian pattern, but the majority had chimneys with copper bands round the caps. The dome covers on the middle of the boiler were shaped somewhat after the manner of a whisky decanter, but contained nothing better than a spring-loaded lock-up safety valve, and a similar lock-up valve was also placed over the firebox casing. The cabs were of various shapes and sizes, some having a distinct resemblance to the London hansom of that day. Another peculiarity of a few of the older engines was the provision of long shallow water tanks, like troughs, which were placed on the platforms the full length of the boiler

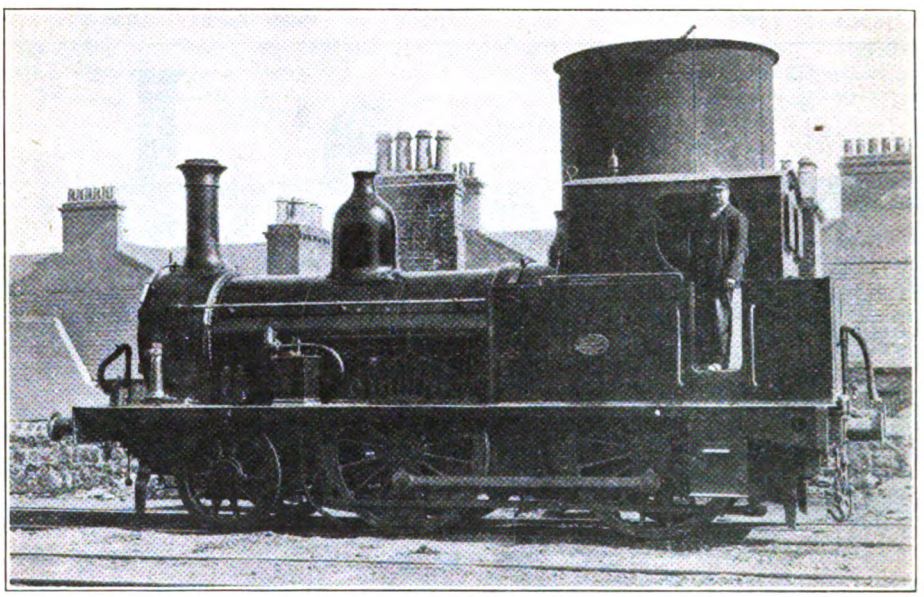

Photo.] **2-4-0 TANK ENGINE No. 41.** [*Loco. Publishing Co. Ltd.*

Built at Grand Canal Street Works, 1882.

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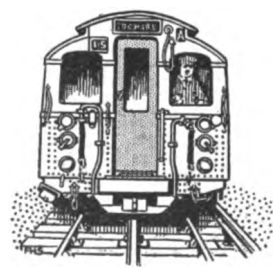
and effectually protected the machinery from any well-meant lubricating efforts on the part of the driver. Altogether, they were a most picturesque collection of locomotives, though none the less interesting on that account, more especially as hardly any of them appeared to be alike, as far as I remember. O'Rourke, who had in the meantime relented somewhat and now condescended on various occasions to include the railways in the "show round," was of opinion that the engines had a "hoith" of hidden virtues and might have been a sight worse, and that I had better not say too much or he would unload himself of a few trenchant observations on the subject of engines in England.

The illustration of No. 5A shows an engine originally built by W. Fairbairn and Sons, of Manchester, in 1854, and rebuilt by the D.W. and W.R. about 1882. When the vacuum brake was fitted at a later date, cast-iron brake blocks were applied to all wheels. Other engines, such as No. 40, had blocks on the leading and driving wheels only. The use of brake blocks on small leading wheels was very unusual. The Neilson engines, Nos. 34 and 35, originally had wood brake blocks applied to the leading and trailing wheels only. They also had Ramsbottom safety valves and round-topped domes, and the Fairbairn type of splashers. Nos. 36 and 40 by the railway company had ornamental splashers and boiler fittings similar to those of No. 41.

The second type consisted of a number of 2-4-0 tank engines, of which the earlier ones, such as No. 41 illustrated, had back well tanks, the later pattern, of somewhat more modern design, having side tanks. But the two first engines of the 2-4-0 type, Nos. 8 and 9, built in 1855 by the Vulcan Foundry, originally had saddle tanks, which were subsequently removed and trough tanks along the platforms substituted. These engines had 5 ft. 3 in. coupled wheels and 15 in. by 22 in. cylinders, as also had No. 41, which was built by the railway company in 1882. The first engines with the long side tanks were Nos. 42 to 44, built by Beyer, Peacock and Co. in 1883, also with 5 ft. 3 in. coupled wheels and 15 in. by 22 in. cylinders.

In 1885 an enlarged class of 2-4-0 tank engine was built at Grand Canal Street Works. This was No. 2, and was followed by similar engines, 45 in 1886, 46 in 1888, 47 in 1889, 9 in 1890, and 49 in 1891. These had 5 ft. 5 in. coupled wheels and 16 in. by 24 in. cylinders. The boilers had round-topped domes on the barrels, and Ramsbottom safety valves over the firebox casings. Some of the cabs were of the "hansom" shape with curved tops.

(*To be continued.*)



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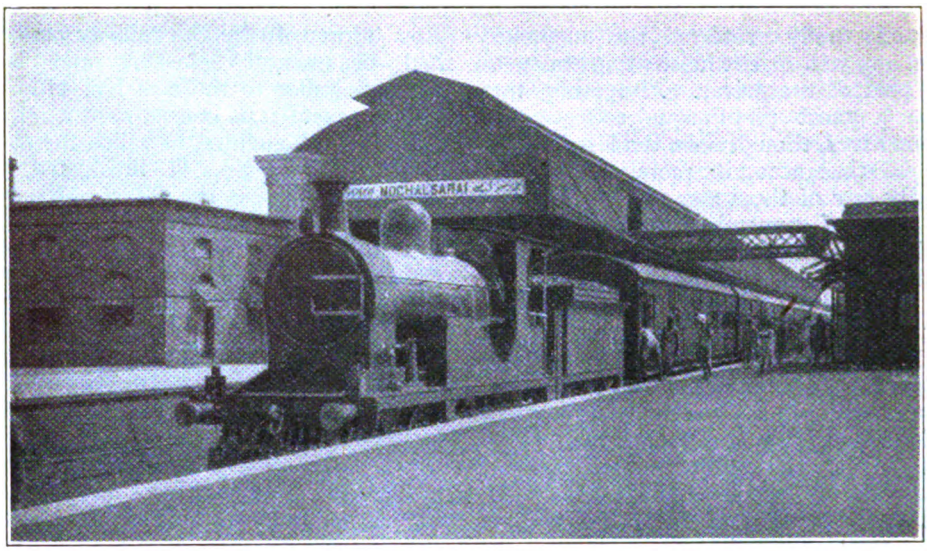

TRAIN AT MOCHAL SARAI.

Across India by Rail.

By B. D. SULLOCK.

THE writer, on a recent short leave from Calcutta, decided to visit the Himalayan hill station of Mussoorie, which, though not the nearest hill station to Calcutta, promised to furnish an interesting journey from a railway point of view. The railway station for Mussoorie is Dehra Dun, on the Hardwar Dehra Dun Railway, which is worked by the Oudh and Rohilkund Railway, and is 970 miles distant from Calcutta. During the season, *i.e.*, from April 1 to October 31, a through carriage runs from Calcutta to Dehra Dun—otherwise two changes are necessary, at Mochal Sarai and at Llakhsar. The through carriage for Dehra Dun is attached to the rear of the East Indian 7.10 p.m. Bombay Mail from Howrah station, Calcutta, immediately behind the dining-car.

On the night of the writer's journey No. 137, E.I.R., 4-4-2 type, hauled the train of nine coaches from Calcutta to Dhanbad. The Bombay mail train takes the old route from Howrah to Burdwan via Bandel, as distinct from the newer Howrah–Burdwan Chord line, and from Sitarampur Junction to Mochal Sarai (the junction for the O. and R. Railway) proceeds over what is known as the Grand Chord Line. This line, opened in 1906, was built to relieve the old main line via Patna, and is now in process of being doubled throughout.

The stretch of main line from Calcutta to Naini, near Allahabad, via Bandel and Patna, is the longest stretch of double line in India, the distance being 509 miles.

Dinner was served immediately after leaving Calcutta, and shortly after leaving the dining-car at Burdwan the writer retired to bed. The next place seen was Mochal Sarai station, at about 7 a.m. Here the Dehra Dun carriage was detached and the Bombay mail proceeded on its way. A halt of two hours enabled a very satisfactory toilet to be performed, while a hearty breakfast was very welcome. Mochal Sarai station consists of two island platforms. We were eventually shunted on to the head of the O. & R. Mochal Sarai–Peshawar mail train and then awaited the arrival of the E.I.R. Calcutta–Punjab mail, which had left Calcutta at 8.30 p.m. and was due to arrive at Mochal Sarai at 9.5 a.m. via

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Patna. Owing to its late arrival at 9.30 a.m., hauled by an ancient E.I.R. 4-4-0 engine No. 08, the O. & R. express due away at 9.30 a.m. did not leave till 9.50 a.m., hauled by 4-6-0 No. 275, built by the North British Locomotive Company in 1907.

This train is the "crack" express of the O. & R. Railway. Our train consisted of eight coaches, including a dining-car which came off at Lucknow. Shortly after leaving Mochal Sarai the E.I.R. engine sheds can be seen on the left, after which the O. & R. Railway turns sharply to the right away from the E.I.R. main line. A short distance further on and followed in 64 minutes from Benares to Janghai Junction. At Partabgarh, the next stop, a through carriage from Allahabad to Dehra Dun was attached. The dining-car at the rear of the train had large observation windows behind from which a very good view of the line and scenery was obtained. After a stop at Rae Bareilli and a run of 60 miles the cantonments of Lucknow appeared and the headquarters of the O. & R. Railway were rapidly approached.

Lucknow is a large station, and here may be seen Bengal and North Western narrow gauge trains and Great India Peninsula trains from Jhansi and Cawnpore.

A TYPICAL INDIAN STATION.

the O. & R. Railway engine sheds may be seen on the right. Soon the railway crosses the River Ganges by the fine Dufferin Bridge (seven spans of 350 ft., opened in 1887). A fine view of the famous Benares bathing ghats may be had on the left, and after stopping at Kashi station we pulled up at Benares. In the cold weather season many tourists visit Benares, but in the month of May it is a place to be avoided.

The O. & R. Railway is double track from Mochal Sarai to Benares except over the Dufferin Bridge, but is then single line for the rest of the journey to Saharanpur except for the nine miles from Lucknow to Kakori. A fast run of 46 miles The station is about to be entirely rebuilt and remodelled, and work on this has already begun. Here we detached our dining-car and changed engines. An interesting sight here in the station was an American 2-6-0 No. 35 built by the Baldwin Locomotive Works in 1900 for the O. & R. Railway. They have had a considerably longer life than the similar engines built in the same year for the Midland, Great Northern and Great Central Railways of England.

Immediately after leaving Lucknow, the G.I.P. Cawnpore line branches off to the left, and a fine new engine shed has been built in the fork between the O. & R. main line and the G.I.P.R. branch.

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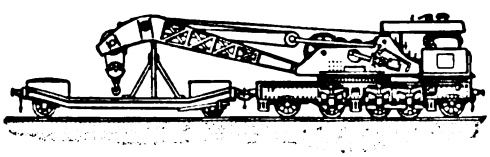
The 43 miles from Lucknow to Balaman Junction took 62 minutes, and after stops at Hardoi, Shahjahanpur and Tilhar, Bareilly Junction was reached at 8 p.m. Here dinner was served in the station dining-room, for which half an hour was allowed. After a stop at Rampur, Moradabad, headquarters of a district, was reached, and engines were again changed. The average passenger, having previously retired to bed, does not usually wake up till Dehra Dun is reached, but much that is interesting takes place during the night. The writer was awakened by a feeling of being shunted, and found that Llakhsar, the junction for the Dehra Dun branch, had been reached and that the Calcutta–Dehra Dun and Allahabad–Dehra Dun carriages had been detached from the Peshawar express by the train engine 4-6-0, No. 278, and shunted on a siding. Incidentally, when the mail train left for Peshawar, an excellent view was obtained of the powerful light given by the large electric head-lights with which all E.I. and O. and R. express engines are now fitted. A 0-6-0 goods engine then came and attached us to a train that had come from Lahore via Saharanpur and Roorkhee.

The Llakhsar–Dehra Dun branch is 49 miles long and from Hardwar onwards steadily climbs, Dehra Dun being 2,000 ft. above sea-level. Hardwar is a sacred town on the Ganges noted especially for the number of monkeys that throng the station, and at times is full of pilgrims who come to bathe in the sacred waters of Mother Ganges. There are three running lines through the station, one platform being an island. Heavy trains are piloted from Hardwar to Dehra Dun.

The first thing on opening the carriage window at 5 a.m. the next morning was to see the green foothills of the Himalayas, and it was a very welcome sight, after the parched plains of Central India in May, as seen the whole of the previous day. Dehra Dun station consists of one single-faced platform, very wide and long, with the usual refreshment and retiring rooms. This ends the journey as far as the railway is concerned, but to get to Mussoorie one proceeds by motor to Rajpur (seven miles) and from there the nine miles to Mussoorie are done on horseback or in a dandy—an arrangement carried on the shoulders of four men. From Mussoorie, 6,500 to 7,000 ft., magnificent views of the eternal snows may be obtained on the one side, and from the other side extensive views over the plains far below. An electric railway has been proposed from Dehra Dun to Mussoorie, but beyond laying the rails alongside the road from Dehra to Rajpur nothing further has so far been done. A motor road has also been proposed.

The return journey to Calcutta was very similar to the outward journey except that at Mochal Sarai we were attached to the rear of the E.I.R. Punjab mail and proceeded by the old main line via Patna to Sitarampore and from Burdwan to Howrah via Bandel. As examples of Indian express running, a table is appended showing some distances run and speeds at which these runs are timed :—

From.	To.	Distance. Miles.	Time. Min.	Speed. M.p.h.
Howrah ..	Burdwan ..	67	90	44·6
Burdwan ..	Asansol ..	65	90	43·3
Benares ..	Janghai ..	46	64	43·1
Janghai ..	Partabgarh..	33	51	38·6
Lucknow ..	Balaman ..	43	62	41·6
Hardoi ..	Shahjahanpur	40	60	40·0



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THE RAILWAY PORTRAIT GALLERY.

MR. J. C. LLOYD, M.Inst.C.E.,

Chief Engineer,

Great Western Railway.

MR. J. C. LLOYD, M.Inst.C.E., who has been appointed Chief Engineer, G.W.R., has held the position of Joint Chief Engineer since November, 1923, when he and Mr. W. Waddell (who retired at the end of 1925) were appointed Joint Chief Engineers, following the retirement of Mr. W. W. Grierson, C.B.E. Mr. Lloyd was born in 1867, and articled to his father, the late Mr. E. H. Lloyd, formerly Divisional Engineer of the Great Western Railway at Neath. Mr. Lloyd was appointed to the company's staff in that town in 1888, and transferred to Plymouth in 1891. He continued there until 1898, when he became Resident Engineer at Cardiff. On January 1, 1901, he was made Chief Assistant to the Bristol Divisional Engineer, and in 1906 was transferred to a similar position at Gloucester. On January 1, 1911, he entered upon the duties of Divisional Engineer at Neath, and on July 1, 1919, transferred to Reading as Permanent-Way Assistant to the Chief Engineer. In November, 1920, he was appointed Assistant Chief Engineer.

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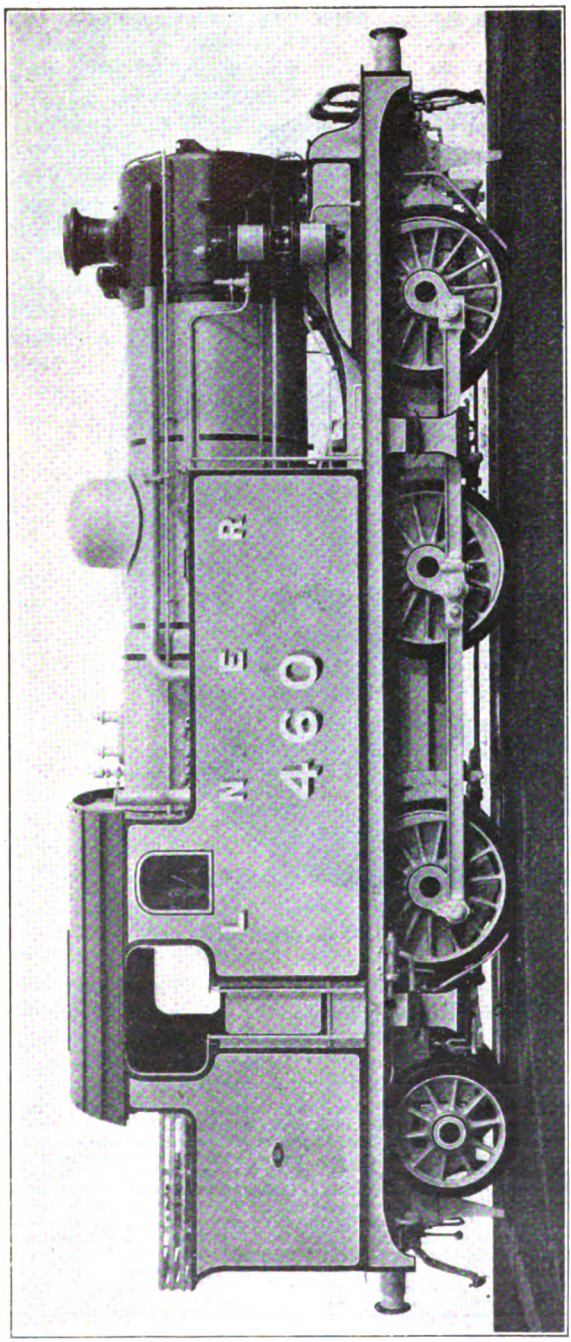

NEW 0-6-2 TANK ENGINE, L.N.E.R.

Mr. H. N. Gresley, C.B.E., Chief Mechanical Engineer.

Cylinders	18 in. × 24 in.	Heating surface, tubes ..	858·1 sq. ft.
Coupled wheels	4 ft. 10 in. diam.	,, ,, firebox ..	110·2 ,,
Steam pressure	180 lb. per sq. in.	,, ,, superheater	134·2 ,,
Grate area	17·7 sq. ft.	Total	1,102·5 ,,

Weight in working order, 62 tons 5 cwt.

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New 0-6-2 Tank Engine, L.N.E.R.

ONE of a number of passenger tank engines built during the past year at the Gorton works of the L.N.E. Railway and by Messrs. Robert Stephenson & Co., Ltd., Darlington, for service in the London area is illustrated on the opposite page. The engines are generally similar to those built by the Great Eastern Railway at Stratford to the designs of Mr. A. J. Hill, but the design has been modified to suit the requirements of the L. & N.E. Railway. The engines which are of the 0-6-2 type have been built to the loading gauge of the Metropolitan Railway, and are fitted with condensing apparatus for tunnel working.

The cylinders, 18 in. dia. × 24 in. stroke, are between the frames. Inside admission piston valves 9 in. dia., driven by Walschaert valve gear, are fitted. The full gear valve travel is 3-15/32 in., the steam lap is ⅞-in., and the cut off in full gear, 71 per cent. Screw reversing gear is fitted on the left-hand side. Single slide bars with cast steel crossheads are used. Cast-iron pistons with two rings are provided. The steam chests and cylinders are lubricated by a four-feed Detroit lubricator placed on the right-hand tank inside the cab. The driving crank axle is built up.

Total coupled wheelbase is 16 ft. 3 in., of which 8 ft. 9 in. is rigid. Length over buffers, 34 ft. 11 in. The trailing end is carried by a radial axle-box. The boiler barrel, which is 4 ft. 8 in. outside dia. and 9 ft. 7 in. long is made from a single plate ½-in. thick. The firebox casing is of the flat-topped type, 6 ft. in length, the copper firebox having an oval flanged firehole. There are 18 flue tubes 5 in dia., and 138 small tubes 1¾ in. dia. outside. There are 18 superheater elements expanded directly into the cast iron header fitted with 2 anti-vacuum valves through which air is drawn through the elements when running without steam.

The total heating surface is as under :—

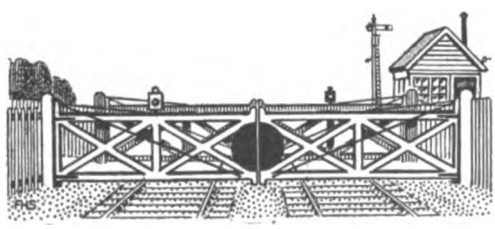
Flue tubes	231·2	sq. ft.
Plain tubes	626·9	,,
Firebox	110·2	,,
Superheater..	134·2	,,
Total ..	1,102·5	,,

The side tanks and bunker are built up of flanged plates and have a water capacity of 1,600 galls. with space for 3¼ tons of coal. The engines are fitted with two 9 mm. restarting injectors below the side tanks.

The Westinghouse brake is fitted to the coupled wheels of the engine. The compressor is carried on the right-hand side of the smokebox and the cast-iron footplate is so constructed as to form the main and auxiliary Westinghouse reservoirs as well as to carry the brake cylinder and shaft.

A Dreadnought ejector is also provided to enable the engine to work vacuum fitted stock, in which case, an automatic valve ensures the application of the Westinghouse brake on the engine when the vacuum brake is applied on the train.

The working pressure is 180 lbs. per square inch, which gives a nominal tractive effort at 85 per cent. of the boiler pressure of 20,512 lbs. The engines weigh 62 tons 5 cwts. in working order, of which 49 tons 15 cwts. are available for adhesion.



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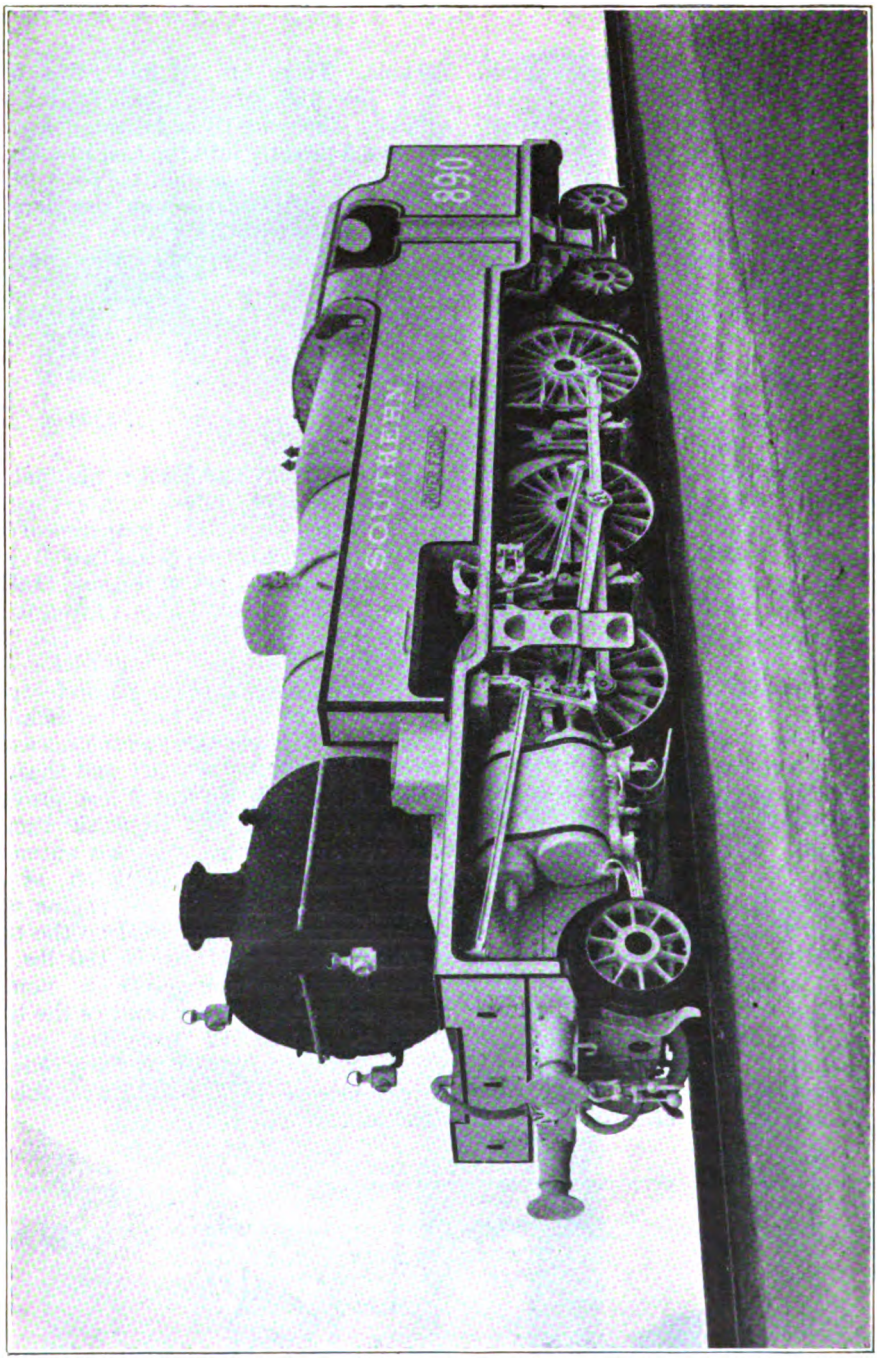

THREE-CYLINDER EXPRESS 2-6-4 TANK ENGINE, SOUTHERN RAILWAY.

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New Three-Cylinder 2-6-4 Tank Engine for the Southern Railway.

EARLY in 1923 one of a series of new 2-6-0 tender engines for the Southern Railway was fitted with three cylinders instead of two. Similarly, one of ten 2-6-4 type superheater tank engines designed by Mr. R. E. L. Maunsell, the Chief Mechanical Engineer, has now been built at the company's Ashford Works, with three cylinders 16 in. diam. by 28 in. stroke, and by his courtesy we reproduce a photograph of the engine herewith.

The cylinders and motion are interchangeable with the 2-6-0 three-cylinder engine No. 822, whilst the boiler, wheels, and other details are identical with those of the two-cylinder tank engines. The arrangement of valve gear, as before, consists of two Walschaerts gears for the valves of the outside cylinders, while rocking levers, connected to these gears operate the valve of the inside cylinder through extension rods.

The single throw crank axle is of the built-up type with extended webs to form counterweights. These balance the crank pin and part of the connecting rod, so that the same wheel centre castings as used for the two-cylinder engines can be utilised by a little adjustment to the balance weights. The inside connecting rod is of the strap bolt pattern, while the outside rods are of the plain bushed type.

The engine is numbered A 890, and has been named "River Frome." It has, as far as possible, been made identical with the two-cylinder engines of the "River"

	Three-cylinder.	Two-cylinder.
Cylinders—		
Number	3	2
Diameter	16 in.	19 in.
Piston stroke	28 in.	28 in.
Piston valves, diam.	8 in.	10 in.
Travel (max.)	$5\frac{3}{4}$ in.	$6\frac{7}{16}$ in.
Wheels—		
Front bogie (Bissel), diam.	3 ft. 1 in.	3 ft. 1 in.
Coupled, diam.	6 ft. 0 in.	6 ft. 0 in.
Trailing bogie, diam.	3 ft. 1 in.	3 ft. 1 in.
Boiler—		
Working pressure	200 lbs. per sq. in.	200 lbs. per sq. in.
Barrel—		
Diam. out., front, diam.	4 ft. $7\frac{7}{8}$ in.	4 ft. $7\frac{7}{8}$ in.
Diam. out., front, thick	$\frac{9}{16}$ in.	$\frac{9}{16}$ in.
Diam. out., at firebox	5 ft. 3 in.	5 ft. 3 in.
Diam. out., at thick	$\frac{5}{8}$ in.	$\frac{5}{8}$ in.
Length	12 ft. 6 in.	12 ft. 6 in.
Firebox shell—		
Width	4 ft. $0\frac{1}{2}$ in.	4 ft. $0\frac{1}{2}$ in.
Length	8 ft. 0 in.	8 ft. 0 in.
Tubes $1\frac{3}{4}$ in. out. diam.	175	175
Tubes $5\frac{1}{8}$ in. out. diam.	21	21
Heating surface—		
Firebox	135 sq. ft.	135 sq. ft.
Tubes	1,390·6 sq. ft.	1,390·6 sq. ft.
Total	1,525·6 sq. ft.	1,525·6 sq. ft.
Superheater (21 elements), inside	285 sq. ft.	285 sq. ft.
Grate area	25 sq. ft.	25 sq. ft.
Total weight of engine in working order	88 tons 15 cwts.	82 tons 12 cwts.
Total weight on coupled wheels	56 tons 15 cwts.	52 tons 15 cwts.
Tank capacity—		
Water	2,000 gallons.	2,000 gallons.
Coal	$2\frac{1}{2}$ tons.	$2\frac{1}{2}$ tons.

TABLE OF DIMENSIONS, THREE AND TWO CYLINDER 2-6-4 TANK ENGINES.

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class at present working on the Southern Railway, with the object of comparing three and two-cylinder simple engines both as regards performance and cost of maintenance in passenger service.

The table on page 123 gives a comparison of the dimensions and weights.

These engines are noteworthy for their sturdy and symmetrical appearance, and reports to hand indicate that the two-cylinder type have been doing excellent service on the Southern Railway. It may be anticipated that this new three-cylinder engine will in some respects even surpass the other class. The tractive effort developed by it, at 85 per cent. of the boiler pressure is 11·34 tons, as compared with the 10·65 tons of the two-cylinder type, and it will be noticed that the new engine is only some 6 tons heavier altogether than its two-cylinder contemporaries, the other main dimensions being identical, with the exception of the number and size of the cylinders.

THE "WHITE TRAIN" IN SOUTH AFRICA.

Mr. H. D. Wright, writing from Kimberley, sends two photographs, one of which is reproduced, showing the special "White Train" built in the South African Government Railways' workshops at Pretoria, and utilised for the journeys made by H.R.H. the Prince of Wales during his recent visit to South Africa. The photograph reproduced shows the train standing at Jagersfontein station, in the Orange Free State. The engine used is one belonging to what is known as the Eighth class. The other view sent by Mr. Wright is hardly suitable for reproduction, but shows the train ascending the incline to Kimberley from the north, hauled by a "10C" class locomotive specially painted and renovated for the occasion.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN,
M.Inst.T., A.I.Loco.E.

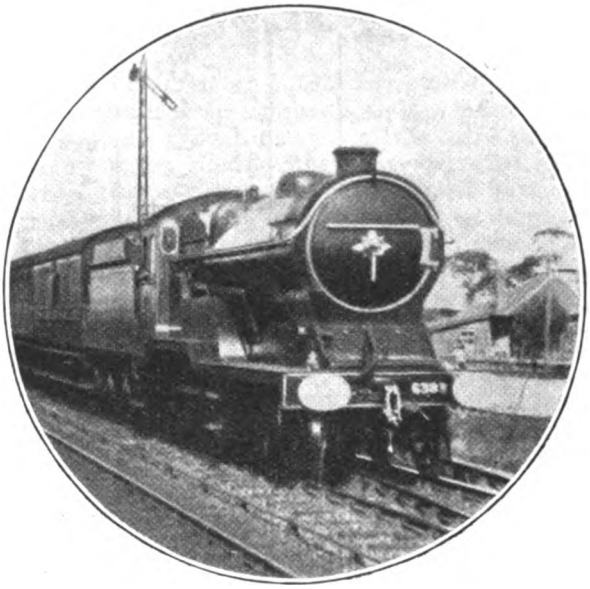

Photo.] [*A. B. Noble.*

EDINBURGH-GLASGOW EXPRESS AT SAUGHTON, L.N.E.R.
G.C. Type 4-4-0, No. 6383, "Jonathan Oldbuck."

IN the debate which followed Lord Monkswell's motion in the House of Lords on November 26 last, some remarkable statements were made by the peers who, with common consent, combined to combat the allegations made by the mover as to shortcomings in our express train speeds and railway equipment generally. Few, even of the keenest critics of British railway practice, would go all the way with Lord Monkswell in the claims that he makes as to possible railway speeds, or as regards culpability in failing to solve, for example, the world-wide problem of the rail-joint. But if, as was suggested by one leading railway journal, Lord Monkswell was "somewhat inaccurate as to facts," such inaccuracy was modest as compared with that of some of the noble lords who followed him. Lord Montagu of Beaulieu, in particular, not only produced a string of figures which were almost entirely inaccurate, but drew comparisons from them, and from certain other sweeping statements which were added, that must be completely reversed as the facts are examined.

The writer yields to none in his admiration of the express train services of this country. Density of circulation of the population of Great Britain allows of express train services whose frequency and length of run give them, as far as is possible to judge, a lead over the express services of any other country in the world. But this is a comparison of national averages. When it comes to the speed performances of individual railways, one is compelled, on examination of the relevant data, to admit that the "blue riband" is no longer held by our own country. So far as concerns Europe, there is little doubt that the palm at the present day must be awarded to the Northern Railway of France, which has now regained all her pre-war supremacy in the realm of speed, and even more. Yet Lord Montagu, in comparing our express locomotive performance with that of the Nord, stated that "Between Paris and Calais the fastest trains take 195 minutes for the journey, a speed of 56½ miles per hour, but there are *dozens* of express trains in this country, with *heavier* or equally heavy loads, travelling over *more severe* routes and negotiating *more difficult* gradients, at a *much higher* average speed." The italics are mine, and serve to throw into even sharper relief the glaring inaccuracy of the comparison.

Dozens of British express trains, we are told, are scheduled at much higher average speeds than those of the Calais boat trains of the Nord, which presumably were

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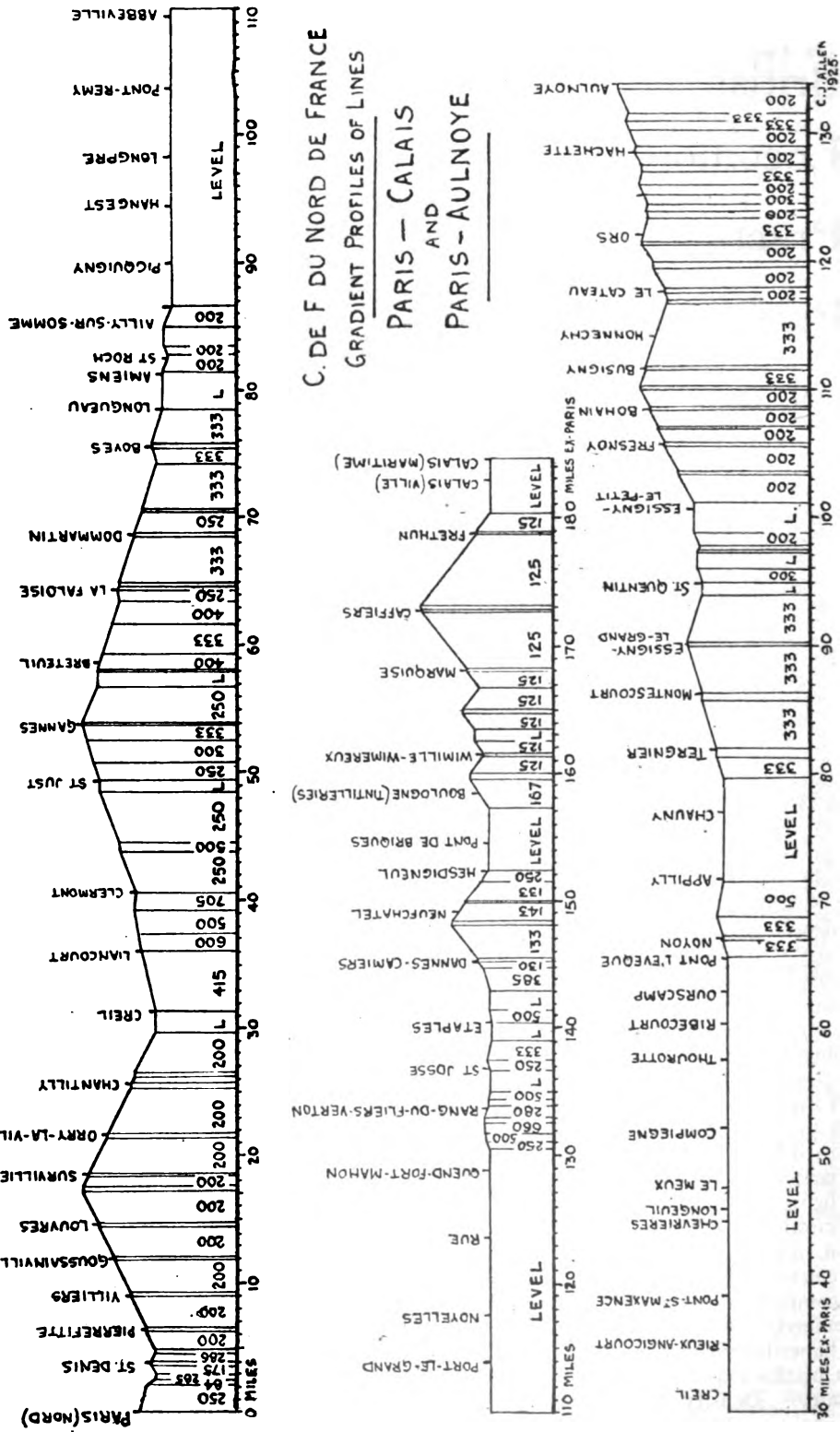

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selected by the speaker as representing, in his opinion, the fastest running performed on that railway. Let us consider this question of schedules first. Lord Montagu is evidently unaware that, owing to the absence of track-troughs, the Calais and certain of the Boulogne boat express trains are booked to stop 4 min. at Abbeville for the purpose of taking water. This means that the 10 a.m. and 12 noon expresses from Paris to Calais are booked to cover the 109·4 miles from Paris to Abbeville in 110 min., start-to-stop, at an average speed, not of 56½ m.p.h., but of 59·7 m.p.h., and I believe that the 8.25 a.m., booked to cover the 158 miles to Boulogne Maritime in 165 min., shares the same timing. The afternoon Boulogne train, at 4 p.m. out of Paris, is required to cover the 140·7 miles to Etaples in 141 min. start-to-stop, at an average speed of 59·9 m.p.h. All these runs include the severe service slack through Amiens. Where are the "dozens" of British expresses which beat such schedules, even on the basis of speed alone? Over comparable distances we find but *two*—the Bath slip coaches off the 11.15 a.m. and 1.15 p.m. from Paddington to Bristol, Great Western Railway, booked to cover the 106·9 miles in 105 min.—but the dead level route over which the latter times are achieved bears little comparison with the gradients between Paris and Etaples, and the loads of the Bristol trains bear no comparison at all with the daily loadings of the Nord boat expresses, as we shall see in a moment.

The continuation run of 75·2 miles from Abbeville to Calais requires to be made in 81 min., in order to complete the Calais journey within the 3¼ hours from Paris, and this start-to-stop average of 55·7 m.p.h. includes a slack over the Outreau junction at Boulogne, slow running through Calais to the Maritime Station, and an intermediate ascent, to Caffiers, which is for no less than eight miles adverse to the engine at 1 in 125. There are a few British runs booked at such speeds over similarly steep routes, but with nothing approaching the loads hauled by the French engines. In the opposite direction the times are, in general, about 10 min. easier overall, but even so 205 min. for the 184·7 miles from Calais to Paris, with 4 min. standing at Abbeville, or 151 min. and 152 min. for the 140·7 miles from Etaples non-stop, are remarkable enough in view of the loads shortly to be cited. Other runs over the same route, although inferior to the foregoing in merit, are by no means to be despised, such as 111 min. for the 103·6 miles from Amiens to Calais, start-to-stop, and 116 min. in the reverse direction, 85 min. for the 78·2 miles from Creil to Paris, and so on. As regards the future, the schedule of 180 min. or even less for the 184·7 miles between Paris and Calais, which is to operate in the case of the forthcoming all-Pullman boat express, will set up a standard of railway speed hitherto unknown in any part of the world as a daily performance over such a distance.

And what of other routes? The services from Paris to Belgium and Germany include some even faster trains than those on the Calais service. The exceedingly heavy 8.10 a.m. express from Paris, with portions for both Brussels and Berlin, is booked to pass St. Quentin, 95·1 miles, in 93 min., and to reach Aulnoye, the first stop, 134 miles, in 136 min. The 7.30 p.m. Brussels express passes St. Quentin in the same time, and reaches Aulnoye in 135 min., at an average start-to-stop speed of 59·6 m.p.h. The 12.30 p.m. and the 8.30 p.m.—two further very heavy trains—are allowed 105 and 102 min. respectively to reach St. Quentin, 95·1 miles, and in the former case the 38·9 miles on to Aulnoye, with a steep initial rise to Busigny, are only allowed 45 min., start-to-stop. The non-stop express trains in each direction between Paris and Brussels have similar bookings over the Paris-Aulnoye section. In the reverse direction 142 min. is the best start-to-stop timing from Aulnoye to Paris, 134 miles, but there are schedules of 100 and 107 min. in from St. Quentin, and 40 min. for the 38·9 miles from Aulnoye to St. Quentin, with the heavy morning express (which only takes 141 min. from Aulnoye to Paris, despite the St. Quentin stop) is another very smart start-to-stop booking.

And then, lastly, the Arras and Lille direction. For the 119·7 miles to Arras, the best non-stop time of 121 min. is made by the 10.15 a.m. express, closely followed by the 7.25 p.m. in 122 min., and the 8 a.m. in 123 min., while no mean feat is accomplished by the two former

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trains in running the 15·6 miles on to Douai in 18 min., start-to-stop. In the opposite direction there are three bookings over the 119·7 miles from Arras to Paris in 125 min., and another very smart run is made by the 7·48 a.m. from Arras, which covers the 41·4 miles to Longueau in 42 min., at a start-to-stop average of 59·1 m.p.h. In all, therefore, the Nord can show six runs of over 100 miles in length booked at start-to-stop speeds of between 59 and 60 m.p.h., against a total of four in Great Britain—two by Great Western from Paddington to Bristol (which are the same trains, of course, as those making the 61·1 m.p.h. runs from London to Bath, from which the Bath coaches are slipped), and two on the L.M.S. between Willesden and Birmingham. At speeds of between 58 and 59 m.p.h. there are three more, as compared with two in Great Britain, again on the Great Western, from Bristol to London. As will be shown in a moment, these nine French runs (to which might reasonably be added the running in France, at corresponding speeds, of the Paris-Brussels non-stops), are made over heavier grades and with very considerably heavier loads, than the six—not "dozens"—British runs to which I have referred.

In view of the general interest which is likely to be aroused by this subject, I have thought it well to prepare gradient profiles of the chief Nord main lines, so that a comparison may be made more readily with the main line profiles of this country. The Calais, Arras and St. Quentin trains share the same tracks for the first 31½ miles, to Creil; there is a good start for the first 2½ miles, for a short distance down at 1 in 84, but for 12 miles from just beyond St. Denis there is a practically continuous ascent at 1 in 200, half as long again as the corresponding Great Northern rise from Wood Green to Potter's Bar. The descent from Survilliers to Creil is 12½ miles long, at the same inclination. Brussels-bound trains now have a practically level line for 50 miles, from Creil to Tergnier, after which follows an ascent of 10 miles at 1 in 333—similar to the North Western grades on both sides of Tring summit—and a 9-mile rise from beyond St. Quentin to the summit at Busigny, ere Aulnoye is reached.

Trains for the Calais and Arras directions continue to keep company as far as Longueau, 78¼ miles from Paris and 3 miles short of Amiens. Between Creil and Longueau we have Gannes summit, approached by an ascent 22 miles in length.

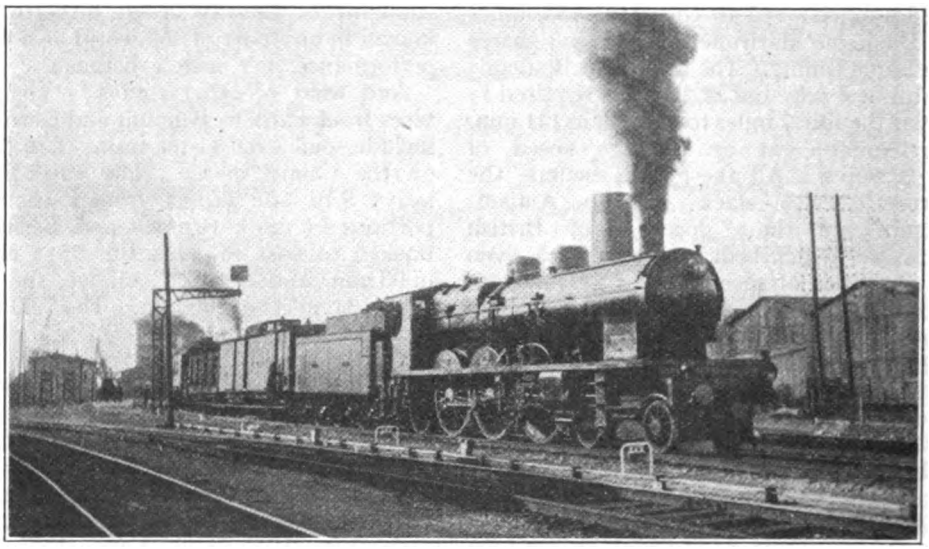

Photo.] 3.5 P.M. CALAIS (MARITIME) TO PARIS BOAT EXPRESS. [*J. Macartney Robbins.*

Nord 4-6-2 compound superheater locomotive No. 3.1162. Note new bogie tender with increased water capacity for non-stop run Paris–Brussels.

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The middle 8 miles of this, between Clermont and St. Just, are at 1 in 250; the lower part is mainly at 1 in 400 and 600, and the upper 4½ miles decrease in inclination from 1 in 250 to 1 in 333. The descent to Longueau is, with short breaks, mostly at 1 in 333 for 25½ miles. Beyond this point few difficulties confront the Arras expresses, the ascent from Mericourt to Achiet, though 16½ miles long, only steepening to 1 in 200 for the final 4 miles. The Calais-bound trains, also, after slacking severely through Amiens, have a round 60 miles of level track forward to Etaples. But there is no more easy running after that. Immediately after Etaples comes the rise to just short of Neufchatel, of which the top 3 miles are at 1 in 130, followed by 3½ miles down at the same inclination to Hesdigneul. Then, after slacking over the Outreau junction, trains for Calais have to tackle the formidable ascent to Caffiers. There are first 10 miles of sharply-broken grades, including 2½ at 1 in 167 and 2½ at 1 in 125 against the engine, followed by 6 miles right off at 1 in 125 to Caffiers Summit. Paris-bound trains are worse off still, as from the very suburbs of Calais, with practically no chance of taking a "run" at it, they have to face 7 miles continuously at 1 in 125 to the same summit point.

Taken all round, therefore, the Paris-Calais main line, from the grading point of view, is more difficult than any of the leading main lines out of London northwards and westwards with the sole exception of the Midland and Great Central. On a rough calculation, the "vertical rise"—*i.e.*, the sum of the heights through which the trains are lifted in adverse gradients, works out at 850 ft. from Paris to Etaples, 970 ft. to Boulogne, and 1,355 ft. through to Calais. As compared with Calais, the corresponding figure from London to Warrington by North Western is 1,035 ft.; to York by Great Northern, 1,345 ft.; to Exeter (*via* Westbury), by Great Western, 1,080 ft. As compared with Abbeville and Etaples, to which points mile-a-minute bookings operate from Paris (there is only a few feet difference between the respective "rise" to each place), 970 ft., or slightly less, may be set against 285 ft. from London to Bristol *via* Bath, 665 ft. to Tamworth, on the North Western, 965 ft. to Grantham on the Great Northern, 1,135 ft. to Birmingham by Great Western, and 750 ft. to Bournemouth by South Western. Many other such figures might be quoted, but these are sufficient utterly to disprove the contention about the "more difficult" gradients over which those "dozens" of express trains in this

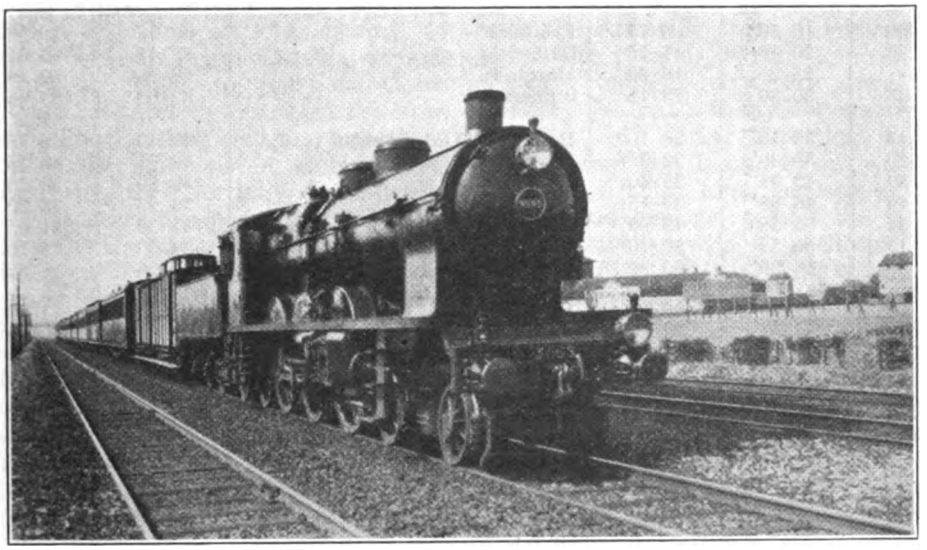

Photo.] DOWN MORNING BOAT TRAIN NEAR PARIS. [*W. H. C. Kelland.*

Nord compound superheater 4-6-2 type locomotive No. 3.1169.

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country are reputed to make "much higher" average speeds. I have not quoted Midland and Great Central figures, as the loads on those routes are so totally inferior to those about to be mentioned, as to offer no basis of comparison.

Another extraordinary statement by Lord Montagu was to the effect that between Calais and Paris there are "46 stations and 9 junctions, while between Euston and Warrington, practically the same distance, there are 59 stations and 52 junctions." This comparison was intended to stress a supposedly greater difficulty in working express-train services at high speeds in this country than in

CHEMIN DE FER DU NORD. CALAIS-PARIS BOAT EXPRESSES.

3.1213 435 465	3.1224 468 500	Distance.	Engine, 4-6-2 No. Load (tons tare). Load (tons full).	Distance.	3.1236 465 500
min. sec.	min. sec.	Miles.		Miles.	min. sec.
0 00	0 00	0·00	Calais (Maritime)	75·20	81 50
					sigs.
5 00	4 40	1·55	Calais (Ville)	73·65	77 45
					sigs.
11 00	10 50	6·15	Fréthun	69·05	—
20 20	20 15	11·75	Caffiers	63·45	66 05
—	25 25	16·90	Marquise	58·30	59 25
31 05	30 30	23·15	Wimereux	52·05	53 05
					sigs.
33 45	33 10	26·10	Boulogne (Tintilleries)	49·10	48 55
39 20	39 30	32·25	Hesdigneul	42·95	42 15
42 50	43 05	35·40	Neufchâtel	39·80	39 20
46 40	46 55	39·15	Dannes-Camiers	36·05	35 20
50 35	50 55	43·90	Etaples	31·30	31 05
57 15	56 55	50·70	Rang-du-Fliers-Verton	24·50	25 10
66 30	66 00	60·90	Rue	14·30	16 35
	sig. stop				
72 10	77 40	67·10	Noyelles	8·10	11 20
81 45	86 55	75 20	Abbeville	0·00	0 00
0 00	0 00	0·00	(Water stop)	109·35	108 00
8 45	8 15	5·60	Pont Remy	103·75	102 00
14 10	13 55	11·20	Longpré	98·15	97 05
21 20	21 10	19·40	Picquigny	89·95	89 50
28 10	28 05	27·05	St. Roch	82·30	—
30 00	30 00	28·15	Amiens	81·20	80 10
34 10	34 20	31·05	Longueau	78·30	76 25
37 25	—	33·55	Boves	75·80	74 20
49 25	48 35	44·60	La Faloise	64·75	—
55 30	—	50·30	Breteuil	59·05	60 45
60 40	60 45	55·00	Gannes	54·35	56 45
65 30	65 15	59·85	St. Just	49·50	51 40
72 55	72 20	68·95	Clermont	40·40	42 30
82 10	80 45	77·90	Creil	31·45	33 15
sigs.	86 55	83·90	Chantilly	25·45	28 25
103 10	95 25	90·95	Survilliers	18·40	22 40
104 35	96 45	91·95	Km. 28*	17·40	21 40
—	—	98·17	Km. 18*	11·18	14 45
—	—	104·40	Km. 8*	4·95	8 00
116 35	109 00	105·25	St. Denis	4·10	6 50
sigs.	sig. stop				
123 10	119 45	109·35	Paris (Nord)	0·00	0 00
			Net times:—		
81¾	81	75·20	Calais–Abbeville	75·20	77¾
115¾	114½	119·35	Abbeville–Paris	119·35	108
197½	195½	184·55	Total (minutes)	184·55	185¾

* Kilometres ex-Paris (Nord).

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France. Actually the French Nord has 50 stations and 8 haltes between Calais and Paris; out of 58 (not 59) stations between Euston and Warrington, 12 are on the six-track electric section between London and Watford, and have not so much as any platforms at all on the main lines; Harlesden, Stonebridge Park and Watford High Street are, in fact, remote from the main lines altogether, and it is ridiculous to include them. Even if haltes be excluded from the French Nord list—although there is no reason why they should be, seeing that a train stopping at a halte can hold up an express, whereas no electric train standing at one of the 12 L.M.S. stations mentioned above could interfere with a main-line train—the total becomes 50 Nord stations against 46 stations between Euston and Warrington.

When it comes to junctions, Lord Montagu has carefully restricted the Nord to main-line junctions only, and has calmly excluded 18 junctions of branch lines, whereas on the North Western every tiniest junction has been duly roped in, such as the Harrow and Stanmore branch, which comes into a bay platform and normally does not touch even the slow lines, let alone the fast lines. Not a word, either, is said as to the fact that the North Western main line is six-tracked from London to Watford and four-tracked thence to Roade, 60 miles, and virtually on to Rugby, 82½ miles, in view of the Northampton loop; then again for 25 miles from Trent Valley Junction to Crewe; while the majority of the line between Rugby and Stafford is three-tracked or four-tracked. Against this the Nord has 31½ miles only of four tracks, from Paris to Creil, so that the express trains over the latter are very far more liable to signal checks from the slower-moving traffic than are those on the North Western, whose fast lines can to a large degree be reserved for the express trains. Here again, therefore, when the facts are examined, Lord Montagu is found to be grossly in error, the actual conclusions based on them being the exact opposite of those drawn by him.

And now as to loads. In my November article I was myself incautious enough to remark that the loads of the boat express trains between Paris and Calais rarely exceeded 400 tons. When I was last across the water, rather over two years ago, this was the case, but I have been forcibly reminded of the rapidity of railway developments by the mass of correspondence which has since reached me on this subject. The fact of the matter is that, since the introduction of the larger Nord "Pacifics," their remarkable capabilities have led to considerable increases in the rostered loads of their trains, which are more generally now in the neighbourhood of 500 rather than 400 tons. Let me quote from a letter received in October last from that well-known authority, Mr. J. P. Pearson, in which he refers, first of all, to the two "crack" trains on the Calais service, booked at 59·7 m.p.h. out to Abbeville, and in 3¼ hours to Calais, with the Abbeville stop. "I have seen either the 10 a.m. or the 12 noon," he writes, "almost every day since September 8"—that is to say, for exactly one month—"and during that time I have never known the 10 a.m. go out with less than 495 English tons, inclusive of passengers and luggage, behind the tender. I have travelled with it when the gross load was 510 tons, an addition of 7 per cent. being made to the tare load of 476 tons in respect of a packed complement of passengers and luggage. Then, as regards the 12 noon, I once saw it with 425 tons, twice with 455, many times with 475, a few times with 500, while on one occasion it sailed into Calais half a minute early with 550 tons! The tare loads were read off the framing of each vehicle, the weight in kilogrammes being afterwards converted to English tons, and so may be accepted as quite accurate."

These figures are confirmed in a most interesting letter from a long-standing Paris reader—Monsieur G. Vuillet—under date September 25 last. At the time when he wrote the rostered daily formation of the 12 noon boat express from Paris to Calais was as follows:—

1 luggage van	15·5	tonnes.
2 second-class cars	65	,,
2 all-steel restaurant cars ..	108	,,
6 first-class (ex-German) cars	267	,,
1 transfer luggage truck ..	30	,,
Total ..	485·5	,,

Conversion to English tons reduces this figure merely to 478 tons, and the gross load at this period must, therefore, have been about 510 to 515 tons daily. My

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correspondent adds that in exceptional circumstances the opposite train to this, allowed 3 hrs. 25 min. from Calais to Paris, has been loaded up to 600 tons, and yet has kept time; and also that, with the normal 510–515 tons load, the new "Pacifics" have about 7 or 8 min. in hand on the faster coast-bound booking.

And what about the loads in other directions? My Paris friend gives the rostered loading of the 8.10 a.m. north express out of Paris, allowed 93 min. to passing St. Quentin and 136 min. to Aulnoye, as between 460 and 470 tons full; this is worked by one of the large "Pacifics," and the 500-ton mark is frequently exceeded. The evening train, with 1 min. less to Aulnoye, is worked by one of the earlier "Pacifics," now displaced from the boat services, and is booked to take 330 tons. Mr. Pearson remarks that when he last travelled by the 8.30 p.m. from Aulnoye to Paris, allowed 142 min., the gross load behind the tender was 515 tons, and but for two bad slacks, he adds, time would have been improved on easily. As regards the very fast Arras services, the best train—at 10.15 a.m. out of Paris—allowed 121 min. for the journey of 119·7 miles, is rostered to take a tare load of 343 tons, making a gross load of 360 tons, and the marvel in this case is that the working is entrusted to the 22-year-old four-cylinder compound "Atlantics," long since withdrawn from the boat train services in favour of the "Pacific" types.

In every single particular, therefore, the case of Lord Montagu breaks down; so far from the express train services of the Nord being in any way inferior to those operating in this country, the boot is very emphatically on the other leg. Only one regularly single-headed British train could compare in loading with the hardest of the Calais boat train turns, and that is the Great Western down "Limited." At week-ends through a certain limited period in the early summer and autumn, preceding and following the full summer time-tables, the "Limited" takes the full 14-coach load which figured in the recent exchange trials. But the gross weight of 530 tons at most only goes as far as Westbury; onwards to Taunton the figure is 455 tons, and thence to Exeter—when Wellington bank has to be surmounted—the weight to be hauled has dropped to 385 tons, whereas the Nord "Pacific" has still her full 515 tons to take over Caffiers. Since the division of the 5.45 p.m. down Leeds express, there is no other regular single-headed train

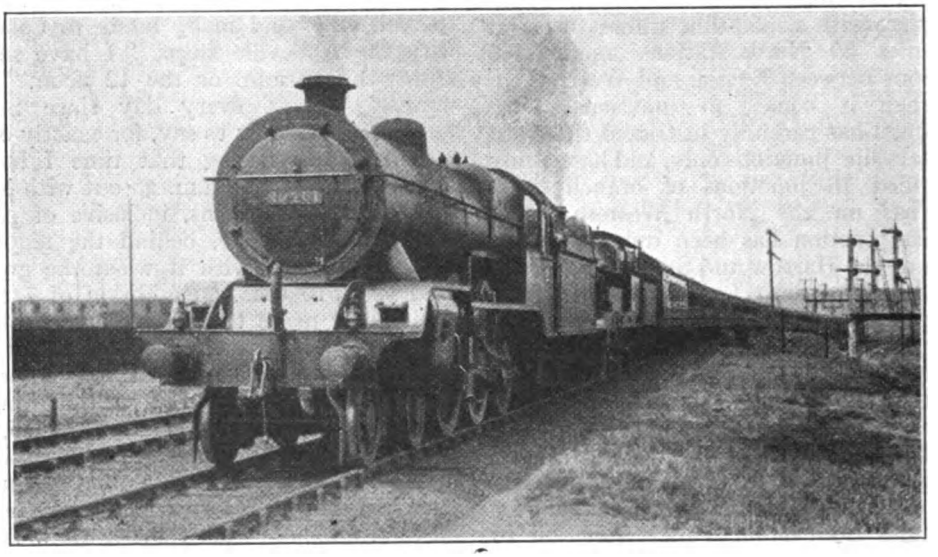

Photo.] EUSTON EXPRESS LEAVING CARLISLE, L.M.S.R. [*H. Gordon Tidey.*

Locomotives Nos. 10461 ("Hughes" 4-cylinder 4-6-0) and 1216 (4-6-0 "Claughton" class).

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formation in this country of the same magnitude as the "Limited," and therefore comparable of comparison with the hardest of these French loads. Occasional loads up to 500 tons appear on the Great Western West of England line, and on the Great Northern section of the L.N.E.R., but they cannot be regarded as other than very exceptional. On the other hand, loads in excess of 400 tare tons have to be piloted on the L.M.S. throughout the year, and from October to May inclusive the figure is further reduced to 360 tons, even over the easy grades of the Western Division south of Carnforth.

was a magnificent effort with 14 vehicles, weighing 465 tons empty and 500 tons full, on the 10 a.m. out of Paris. In all cases the engines employed were of the latest four-cylinder compound "Pacific" type, weighing without tender 93 tons, or ½-ton more than the Gresley "Pacifics" on the L.N.E.R.

With the 465-ton load No. 3.1213 maintained 36 m.p.h. up the 1 in 125 to Caffiers, and so smart a "run" was taken at the 7-mile bank that the average speed from Calais Ville to the top was almost exactly 40 m.p.h.; this was done in spite of a heavy side-wind, with driving rain.

Photo.] DOWN LEEDS EXPRESS, L.N.E.R. [*H. Gordon Tidey.*

Pacific type locomotive No. 2545, "Persimmon."

The inquiry in the mind of the reader will now be as to how these compound locomotives of the Nord behave on such duties. The correspondents to whom I have referred, as well as one or two others, have supplied me with careful details of some last summer's runs, and it is therefore possible amply to satisfy this curiosity. In the table reproduced herewith are given logs of three boat express runs between Calais and Paris. In the first, timed by Mr. E. L. Bell, the train weighed 435 English tons empty, and 465 tons full; in the second the load was the full rostered 12-coach train of 468 tons tare, or 500 tons full, was taken. The coast-bound journey

No exceptional speeds were done down to Marquise and on to Boulogne, but the Outreau Junction, between there and Hesdigneul, was taken at a fairly high speed, and Neufchatel summit was then rushed without the average speed between Hesdigneul and Etaples falling below the mile-a-minute rate. Unfortunately, my correspondent gives very few actual minima or maxima in his logs, and none further on this particular run. It will be noted, however, that after the Abbeville stop, No. 3.1213 maintained well over 60 m.p.h. on the level from Pont Remy to St. Roch, and then, after slacking through Amiens, ran the distance of a shade under

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24 miles from Longueau up to Gannes in the fine time of 26 min. 30 sec. No special haste was made from Gannes down to Creil, as the train was well on time, but a string of signal checks from Creil up to Survilliers, and a final check between St. Denis and the Gare du Nord, rather spoiled the finish of the run. Net running time for the journey was 195½ min., or 5½ min. under schedule.

With the 500-ton load in the second column, No. 3.1224 did some fine work. This run was timed by Mr. C. E. W. Neat, On the short level out of Calais, speed rose to 44 m.p.h., and then fell finally to 32 at Caffiers, alternate kilometres from 286 being run at 40, 36, 34, 32½ and 32 m.p.h. There was some rapid running down Marquise bank, with speed maintained at, or slightly above, the "limit" for some distance; but the rate of progress was carefully reduced over Outreau Junction, with the result that No. 3.1224, which had just bested No. 3.1213 to Boulogne, fell slightly behind her at Hesdigneul. But speed rose to 62½ m.p.h. at the latter point, and Neufchatel summit was taken at a minimum of 48 m.p.h., after which the speed down to Etaples ranged round about 72 m.p.h. On the level from Etaples (evidently passed at a higher speed than that of 3.1213), a rate of 67 m.p.h. was maintained to Quend-Fort-Mahon, after which came a most annoying and lengthy signal slowing, and finally a dead stand of 80 sec. at Ponthoile-Romaine, costing fully 6 min. Net time from Calais to Abbeville was thus only 81 min.; but by reason of the delay only 115 min. was left for the run of 109·4 miles to Paris.

Between Abbeville and Amiens, where the service slack was well observed, speed rose on the level to 70½ m.p.h., and then the fine time of the previous run from Longueau up to Gannes was actually bettered, the average speed up a bank longer and harder than from Wembley up to Tring—with 500 tons—being 54·4 m.p.h., despite a p.w. slack to 43 m.p.h. through Breteuil. The engine attained 60 m.p.h. on the slight dip after Longueau, fell to 53 on the 1 in 250 to La Faloise, and then, after the check, recovered magnificently to 60 on the short level before the summit, topping the final 1 in 250 at 57½ an hour—an amazing effort. No time was lost in descending to Creil, speed being maintained at between 72½ and 77½ m.p.h. for most of the distance. There was some further wonderful climbing to Survilliers, speed falling gradually to 53½ m.p.h. at

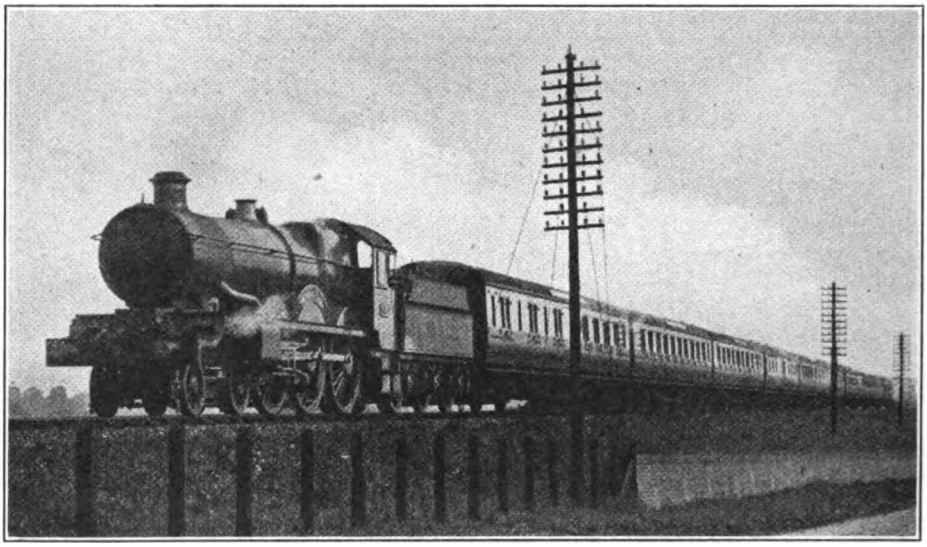

Photo.] DOWN CORNISH RIVIERA EXPRESS, G.W.R. [*M. W. Earley.*

Four cylinder 4-6-0 locomotive No. 4084, "Aberystwyth Castle."

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Chantilly, 50 at Orry-la-Ville, and 47½ from Survilliers to the top, making a total of 16 min. exactly for 14.05 miles from Creil to the summit at 28 km. out of Paris. Thus an average of 52·7 m.p.h. was maintained with 500 tons up this long bank almost entirely 1 in 200—a speed superior to that usually maintained by L. & N.E. "Pacifics," with considerably lighter trains, up shorter banks at the same inclination, on the Great Northern main line. With an average speed of not more than 65 m.p.h. from 28 km. to St. Denis, a punctual arrival was certain, but was prevented by a signal stop outside the terminus; net running time from Calais, nevertheless, was 195½ min., or 5¼ min. under the allowance.

Even the last run, however, does not come up to the astonishing effort of No. 3.1236 on the coast-bound 10 a.m. journey, again with 500 tons. Despite a slow start out of Paris, owing to the engine slipping furiously on a wet rail in the start on a sharp curve out of the Gare du Nord, Abbeville was actually reached in less than "even time," and allowing for signal checks at Boulogne and outside Calais, the 75·2 miles from Abbeville, over Neufchatel and Caffiers summits to Calais were run in 77¾ min. net—a gross gain of 5¼ min. on the very fast running allowance of 191 min. for 184·55 miles from Paris. On this basis a non-stop run would not have taken more than 182 min., in all probability—and with a 500-ton train! It should be noticed, in particular, that the unbroken 12·45 miles of 1 in 200 from 8 to 28 km. were run in 13 min. 40 sec., at an average speed of 54·7 m.p.h. and the 22·9 miles from Creil up to Gannes in 23 min. 30 sec., at an average of 58·5 m.p.h.; and that the 14·2 level miles from Picquigny to Pont Remy were covered in 12 min. 10 sec., at an average rate of exactly 70 m.p.h. Then, lastly, after a magnificent exit from Abbeville to Etaples, whereby "even time" was bettered in 30 miles from the start, by reason of an average speed of 70·6 m.p.h. over the 23¼ level miles from Rue to Etaples, Neufchatel summit was breasted at a minimum of 50 m.p.h., and the 1 in 125 up to Caffiers at the lowest speed of 37½ m.p.h. My correspondent adds, and with some reason: "I am afraid even the trial runs over the G.W. and the L.N.E., during the recent exchange, have to take second place to this effort, and especially as it was an every-day

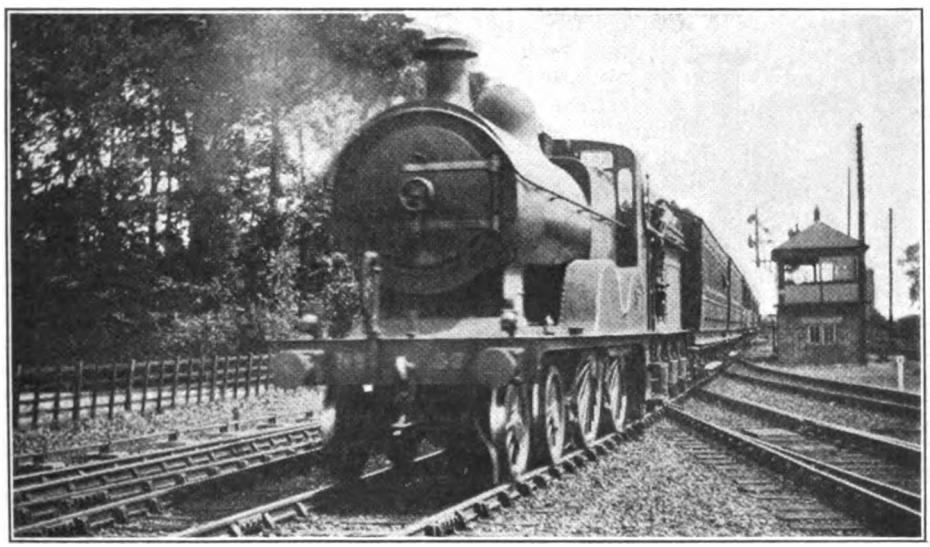

Photo.] [*E. E. Bolt.*

LOWESTOFT-LIVERPOOL EXPRESS PASSING SUTTON BRIDGE, M. & G.N. JOINT RLY.

M. & G.N. rebuilt 4-4-0 locomotive No. 57.

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kind of performance. The weather was very bad after Etaples, with drenching rain and a strong north wind."

Monsieur G. Vuillet also includes, with his data, some notes concerning extraordinary runs which were made with these engines when the drivers were aware that their work was the subject of record. With a train of 430 tons No. 3.1224, driver Taverne, averaged in speed 57·8 m.p.h. from St. Denis up to Survilliers, despite a slack to 50 m.p.h. at the foot of the 1 in 200. At Goussainville the speed had risen to 59½ m.p.h., and the minimum at the summit was 56 m.p.h. breasted at speeds of 62½, 59, 56 and 56 m.p.h.—maintained on 1 in 131 with a 430-ton train!—in 2 min. 33½ sec. "This is wonderful," my friend comments, and few readers will be disposed to quarrel with his claim. Net time from Paris to Boulogne on this run, calculated on a non-stop basis and allowing for all delays, was 144 min. for the 158 miles, a start-to-stop average of 65·8 m.p.h.

The second run, in the reverse direction, was still more notable, and in this case the engine was really being extended, as the consumption of coal necessary to achieve the speeds about to be detailed

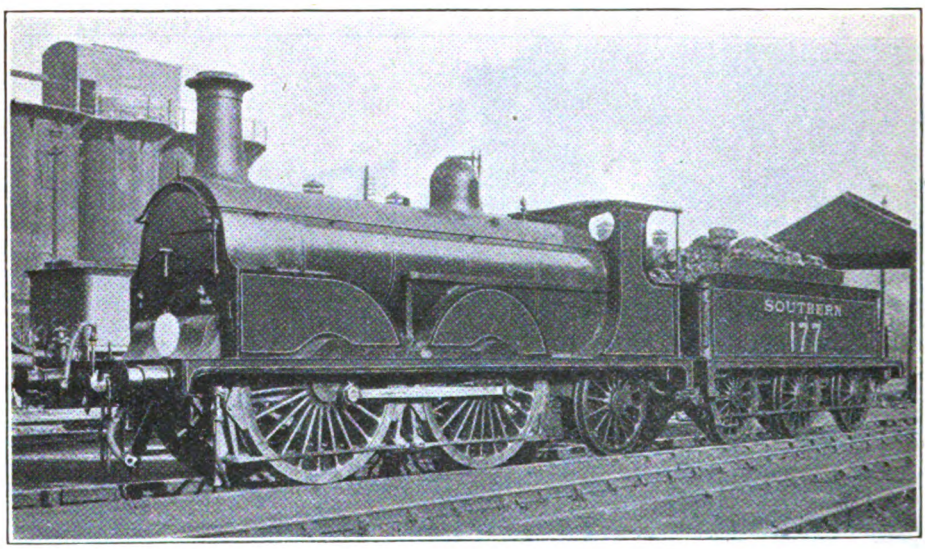

Photo.] [*H. Gordon Tidey.*

L.B.S.C. "STROUDLEY" 0-4-2 LOCOMOTIVE No. 177, IN NEW SOUTHERN LIVERY.

During the ascent to Gannes, prior to a relaying check, the speed, which had risen to 70 m.p.h. on the slight dip beyond Clermont, was maintained at 67·6 m.p.h. on the ensuing rise at 1 in 250, for three successive kilometres, the 4 km. between posts 65 and 69 (the latter approximately 43 miles from Paris) being only 2 min. 10½ sec. Beyond Abbeville the speed on the level rose to no less than 78½ m.p.h. at Etaples, which, the writer remarks, is the highest rate he had ever known run over the curve through that station. On the gradual rise which precedes the 1 in 131 to Neufchatel summit speed fell to 62 and then recovered to 67½ m.p.h., while the final 4 km. of the ascent were was some 500 kg. above the normal amount. The train was the afternoon Etaples-Paris non-stop, allowed 151 min. for the journey of 140·7 miles; the load was of vast dimensions, consisting of 14 bogie vehicles, weighing 506 tons empty, and with a packed load of passengers and luggage, 560 tons full; while the engine was No. 3.1206. Out of Etaples the first 6·1 km. (3·8 miles), on the level, were covered in 5 min. 54 sec., necessitating a horse-power output of fully 2,600. Speed at that point had risen to 63 m.p.h., and onwards on the level it was maintained at an average of 69·6 m.p.h. for a little short of 28 miles to Abbeville, and at 67·5 for the ensuing 27 level miles to

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St. Roch, the former town (31·3 miles from the start) being passed at reduced speed in 30 min. 50 sec., and Amiens, 59·5 miles, at 10 m.p.h., in 57 min. 55 sec. Allowing for a relaying check at La Faloise, the average speed up the 35 km. between posts 121 and 86, to Gannes, was 57·2 m.p.h., after which an average of 74·6 m.p.h. was maintained over the 13·5 miles from St. Just to Liancourt. From Creil, passed at 56 m.p.h., the average speed up to Chantilly was 56·6 m.p.h., and speed at that point, after 4 miles up at 1 in 200 (with 560 tons) had not fallen below 54½ m.p.h., but at Survilliers summit the minimum was 47½ m.p.h. For the complete 14·1 miles of the ascent, commenced at under 60 m.p.h., the average rate was 52·2 m.p.h.—a very fine achievement. Signal delays followed, but the net time for the 140·7 miles my correspondent estimates at 140 min.

Monsieur Vuillet, to whom I am personally greatly indebted for the mass of valuable information contained in his letter, adds a note to the effect that the coal consumption of the "Pacifics" on the boat train services generally varies, according to weather, delays, &c., between 17 and 20 kg. per km. This is equivalent to a consumption, in British units, of 55 to 65 lb. per mile, or very little over the maximum figures in the recent G.W.-L.N.E. exchange trials, despite the fact that the French fuel is considerably inferior to that employed here. Calorific value of the fuel used on the Nord is, in fact, about 13,000 B.T.U., as against approximately 15,000 B.T.U. in the case of Yorkshire coal and about 16,000 B.T.U. with the best Welsh steam coal, as used on the G.W.R.

Lastly, I revert to Mr. Pearson's letter, because in detailing an everyday performance on the 10 a.m. from Paris to Calais he has instituted a most instructive comparison with the best of the runs made by *Caldicot Castle* in the English exchange trials of last summer. On this occasion "Pacific" No. 3.1227 had a gross load of 510 tons behind the tender. St. Denis was passed in 6 min. 10 sec., and thereafter to Survilliers, passed in 21 min. 40 sec., speed barely varied from 41 sec. per k.m. up the 1 in 200, or 54½ m.p.h. The 18 k.m. between posts 9 and 27 took exactly 12 min., at an average of 55·9 m.p.h. Creil was passed in 42 min. 14 sec., or a minute less than the run tabulated; Gannes in 55 min. 20 sec., Longueau in 76 min. 33 sec., and Amiens in 81 min. 9 sec. Signals were on before Longueau, and through Amiens, culminating in a dead stand for 85 sec. at the 135·4 km. post, the delays costing 7¼ min., by my correspondent's reckoning. In consequence, Abbeville was not reached until 115 min. 29 sec. after leaving Paris, with a very slow stop, but the net time was 108¼ min. Then, from the fresh start, Etaples was passed in 31 min. 14 sec., the final kilometre to Neufchatel summit was run in 46 sec. (= 48½ m.p.h.), Boulogne was passed in 47 min. 41 sec., Caffiers in 63 min. 29 sec., and Calais was reached in 76 min. 44 sec., or 4¼ min. under schedule time. Up the last 6 k.m. to Caffiers Summit the times recorded were, in succession, 41, 43, 44, 49, 50, and then a sudden drop to 56 sec., probably through a slightly premature notching up of the engine. Fifty seconds per kilometre corresponds to 44½ m.p.h., and 56 to exactly 40 m.p.h. Despite the loss of 7¼ min. by signals, and a stop at Abbeville of exactly the 4 min. booked, Calais was reached only 1¼ min. late, so that the engine had economised altogether 6 min. on schedule time, with 510 tons.

"I fancy," Mr. Pearson's letter concludes, "that this run is better than *Caldicot Castle's* best down journey in the exchange trials. On that occasion the latter made Exeter in 169 min. 25 sec., with a gross load of 530 tons to Westbury, 455 tons to Taunton, and—the least load over the worst grade—385 tons to Exeter, or, say, 485 tons average throughout. Now, Caffiers is just about the same distance from Paris as Exeter from Paddington (172·8 miles against 173·7 miles), and an analysis of the respective overall times—182 min. 59 sec. and 169 min. 25 sec.—is of interest. The French "Pacific" lost 7¼ min., over and above the usual Amiens slack, by signals, stood 4 min. 1 sec. at Abbeville and lost additionally at least 3½ min. here by slowing down and restarting, while the normal Amiens slack and the disadvantage of being limited to a maximum speed well under 80 m.p.h., are together worth fully 4 min., leaving a net time of 164¼ min. As between the

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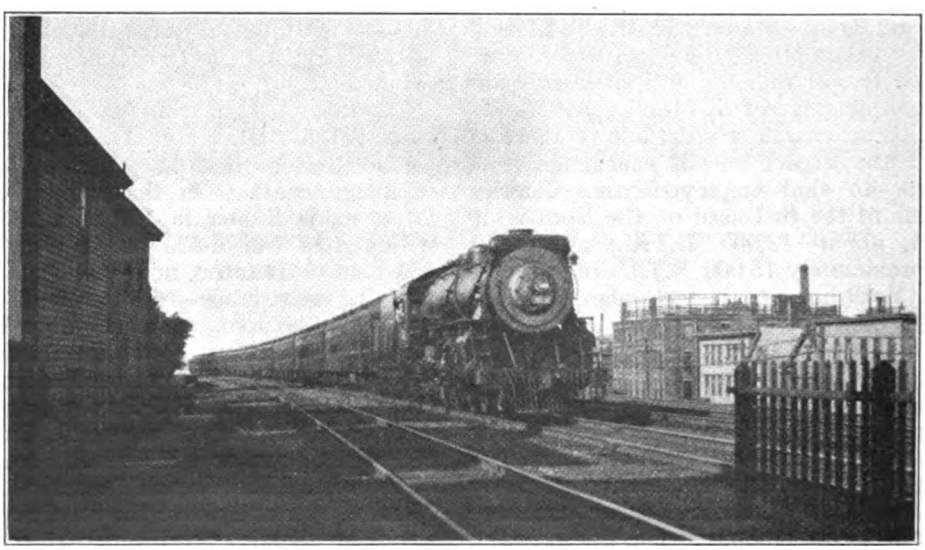
actual speeds through Reading, Westbury and Frome, and a maintained full speed, *Caldicot* lost, as nearly as I can estimate, 4½ min., leaving a net time in this case of a shade under 165 min., or ¾-min. more than the French machine for 0·9-mile further."

In view of the fact that the Nord load, taken as an average, was the heavier, and very materially the heavier up Caffiers, as compared with Whiteball, also that the aggregate grades on the Nord were more severe, and, lastly, that the Nord engine had had none of the advantage of the descent from Caffiers to Calais, as against *Caldicot's* run down from Whiteball to Exeter, the fact emerges that the every-day journey of the French "Pacific" was appreciably superior to the star performance of the "Castle," although the latter had probably never been equalled previously with a corresponding load.

Here I must leave the subject. If the Nord 4-cylinder compounds beat the Great Western "Castles," then by an even more substantial margin they beat every other British express locomotive type. It would be interesting to compare the possible performances of a Great Western "Castle," if the type could be expanded out in an exact proportion of tractive capacity from her weight of 80 tons to the French weight of 93 tons, which would, of course, involve the use by the Great Western of the "Pacific" wheel arrangement, and see what difference then, if any, would be found between the work of the respective types. Meanwhile, however, on the showing of these figures, it would appear that Great Britain has to take second place.

THE "MERCHANTS' LIMITED," N.Y., N.H. & H.R.R.



WE are indebted to Mr. Carlton Parker, of Brookline, Mass., U.S.A., for the photograph reproduced, showing the "Merchants' Limited" five-hour Boston express on the New York, New Haven and Hartford Railroad. The view is taken at Jamaica Plain, soon after leaving Boston. The train is entirely made up of Pullman parlour cars, the schedules each way being 5 p.m. dep., arr. 10.10 p.m.

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RAILWAY MAGAZINE *readers desiring information should mark envelopes " Query " in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning " British Locomotive Practice and Performance " may be addressed to Mr. Cecil J. Allen, c/o* RAILWAY MAGAZINE, 33, *Tothill Street, Westminster, London, S.W.*1. *No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or " grouping," the pages of the " Railway Year Book "* (5s. *net*) *should be consulted. The twenty-eighth Annual Edition* (1925) *of this standard railway reference work is now published. All previous Editions are out of print.*

Train Recording at Signal-Boxes.

On all lines, and, with a few special exceptions, at every signal-box, the times at which signal-code messages are sent, if not the actual passing of every train, are recorded as a matter of routine. In cases of inquiry this information is often of importance, while a check is thus afforded upon the manner in which the men have carried out their duties. Where train control is in operation signalmen at essential points are often required to advise the district or head control office of the movements of trains, this being an essential feature of the control system. The use of large numerals on engine tender or tank sides facilitates the recording of train movements for control purposes, these numbers being used for identification, even although the tender number may be different from that of the engine. Where small numbers only are used, it is less easy for the signalman to transmit information on this basis, though train numbers and other identification means are also available according to the method in force locally. We cannot say whether 60-ft. rails, as also the use of felt pads beneath the chairs, will become the general standard throughout the L.M.S.R., though the use of both will, no doubt, be extended.

[Reply to J. H. A. W.]

Oil-Electric Cars.

Your suggestion that an oil engine might be used alone is one which naturally arises in the mind of the non-technical reader. There are, however, many advantages attending the use of a combined system. If an internal-combustion engine is used alone, it must have elaborate and heavy gearing, and frequently complicated mechanism to allow for the variable conditions under which the work has to be done, bearing in mind that the internal-combustion engine is one which essentially calls for a steady running speed. On motor cars and for small-scale work this is quite practicable, but if large powers are to be exerted, as would be the case in standard railway practice, the problem becomes a difficult one. By using the internal-combustion engine to drive a dynamo which supplies traction motors, the engine can work under the conditions for which it is designed, while the electrical plant replaces the transmission gear and enables the necessary adjustments to suit

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variable working conditions to be made much more smoothly.

[Reply to K. W. ARNOTT.]

"Experiment" Class Locomotives, L.M.S.R.

We have already explained that the withdrawal of several engines of this class does not by any means imply that they should be regarded as failures. For a great many years they have done a considerable part of the general work, though they naturally disappeared more or less from express duty following the introduction of the corresponding "Prince of Wales" superheated class and the "Claughtons." The "Experiment" locomotives were numerous, and it is, therefore, only natural that, for one reason or another, one here and there should be deemed unsuitable for rebuilding. It has, indeed, been suggested on several occasions that they should be superheated, and they would then correspond with the "Prince of Wales" class. Meanwhile, the remainder of the "Experiments" are still at work, largely performing mixed-traffic duties, for which they have proved so eminently suitable.

[Reply to E. LITTLE.]

Great Northern Railway at Bedford.

The late Great Northern Railway had no running powers to Bedford either via Sandy (late London and North Western Railway) or Hitchin (late Midland Railway). We have no information as to any agreement (if there be such) between the late Great Northern Railway and the late London and North Western Railway in respect of traffic between Bedford and the north via Sandy. We think it quite unlikely that the London and North Eastern Railway will build a branch from Tempsford to Bedford, and improbable that the London Midland and Scottish Railway will dispose of its Bedford–Hitchin line to the London and North Eastern Railway, although the line has been of little use to the London Midland and Scottish Railway (late Midland Railway) since the Bedford–St. Pancras line was opened 57 years ago.

[Reply to "BEDFORDIAN."]

Locomotive Superintendents, L.S.W.R.

The periods of office of the gentlemen named by you were as follows:—

Mr. W. Adams, 1877–1895.
Mr. D. Drummond, 1895–1912.
Mr. R. W. Urie, 1912–1923.

We note your request that occasional articles should be included dealing with constructional aspects of locomotive practice, and will bear your suggestion in mind. We may, however, point out that at various periods quite a number of incidental aspects have received attention, while we have published many articles dealing with the more important aspects of locomotive design. Mr. Allen, too, touches upon various points in the course of his articles. We are glad to hear that you appreciated the series of Railway Centenary articles.

[Reply to G. E. FENTON.]

L.N.E. (N.E. Section) Engines at Sheffield.

Working of the Newcastle and Bristol mail by North Eastern engines between York and Sheffield (Midland) is an old-standing arrangement. In this connection you are incorrect in describing the route traversed as "Midland" seeing that from York to Ferrybridge, 19¼ miles, is exclusively L.N.E. line; from there to Swinton, 16¾ miles, is the old Swinton and Knottingley Joint, late Midland and N.E. and now L.M.S. and L.N.E. Joint; while only the remaining 10½ miles into Sheffield is exclusively "Midland" and now L.M.S. The remaining passenger trains between York and Sheffield (Midland), are however, worked by engines of the Midland Division of the L.M.S.

[Reply to R. HALKETT, JUNR.]

Named Locomotives, S.R.

It is true that we have published lists of names which are being given to Southern Railway locomotives. In some instances, however, the engines have not yet received their names, or, if a change is involved, that has not yet been carried out. Presumably, this explains why you have seen L.B.S.C. 4-4-2 engine No. 39 still carrying the name *La France*, and No. 38 without a name at all, although, according to the information so far issued, they will eventually be named *Hartland Point* and

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Portland Bill respectively. We note your remarks as to engines seen in the course of your journeys.

[Reply to T. M. F. LIGHTLY.]

Vibration in Coaches.

It is difficult at times to account for exceptional vibration of a temporary character. Inaccuracies in locomotive valve-setting will occasionally account for unusual "push-and-pull" sensations in the carriages, at low or medium speeds; partial synchronisation of spring vibrations and vibrations derived from the passage over rail-joints, by the superimposition of small motions, may cause excessive vibration at certain speeds; these and many other causes, usually more attributable to coach construction and suspension than to track defects, may have accounted for the experience to which you refer.

[Reply to J. A. DANE.]

Hull Stations.

Although no article has appeared recently in the pages of the RAILWAY MAGAZINE, the Paragon station was dealt with in the August, 1910, number. Presumably, discarded locomotive chimneys are utilised as scrap when removed. We have no information as to whether any special steps are being taken to preserve representations of pre-grouping colours, crests and lining out of locomotives and rolling-stock, but may suggest that, in default thereof, the colour plates given in the RAILWAY MAGAZINE in past years will, to some extent, serve the purpose.

[Reply to E. B. P.]

Foreign Railway Affairs.

We have no knowledge as to the intention of the Belgian State Railway administration to renew the special track between Brussels and Antwerp as laid before the war, nor have we any knowledge of any particular electrification schemes in progress in Belgium. The principal railway journals in the United States are the *Railway Age* and the *Railway Review* (weekly), and *Railway and Locomotive Engineering* (monthly), though there are several other publications of a technical nature devoted to particular sections of the railway industry.

[Reply to H. A. COOPER.]

The "Finest" Engines.

As to which railway companies possess the "finest models" of engines must be entirely a matter of opinion, which we certainly have no intention of expressing in these columns. The abandonment of the Raven "Pacific" design in new locomotive constructions on the L.N.E.R. must not in any way be construed as implying their "failure" but simply as the necessity, from the standardisation point of view, of cutting down the number of types under construction to the minimum possible.

[Reply to G. H. C.]

Indicator Shelters.

The "King Arthur" class locomotive you saw passing Surbiton was fitted with a shelter round the front end to enable assistants in the locomotive department to observe and manipulate indicators for taking indicator diagrams and appliances for other tests. On every railway, and particularly in regard to new engines, tests of this kind are conducted now and then. This explains why the observers occupying the shelter were wearing goggles and otherwise equipped for their somewhat uncomfortable job.

[Reply to "COSSINS."]

Locomotive and Train Working.

Mr. Ahrons has yet to deal with several further railways before his series entitled "Locomotive and Train Working in the Latter Part of the Nineteenth Century" is completed. We will bear in mind your suggestion that similar articles dealing with twentieth-century locomotive development should follow. We cannot understand your complaint that you cannot find lists of types and the number of engines of each type in the RAILWAY YEAR BOOK. You will find them given in the statistical sections following the historical sketches.

[Reply to J. F. MCEWAN.]

Meldon Viaduct, Southern Railway.

This viaduct consists of six spans, varying between 81 ft. and 84 ft. each, the total length being 552 ft. The rails are 150 ft. above ground level. The first viaduct was for a single line, that to Holsworthy, and was opened in October, 1874. When the extension from Meldon

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to Plymouth was constructed, the viaduct was widened to accommodate a double line of rails, which was brought into use in 1879. The viaduct was an important engineering work at the time. We have no precise information as to its cost.

[Reply to R. S. JOHN.]

Shepherds Bush and Hammersmith Line.

Until the War a few L. and S.W. trains worked from Waterloo, via Addison Road, Hammersmith, and thence to Turnham Green, on lines (now disused) which parallel those used by District trains as far as Turnham Green, and thence to Richmond. This route is now entirely disused between Addison Road and Gunnersbury. It was contemplated that the Central London Railway would connect up with it and utilise it for through trains to Richmond. So far, we understand, the project is not being proceeded with.

[Reply to H. MURRELL.]

Midland Compound 4-4-0 Engines.

We believe the crank arrangements of these engines to be that the cranks of the outside (L.P.) cylinders are set at the usual angle of 90 deg. to each other, and that the crank of the inside (H.P.) cylinder divides the remainder of the circle, being set at 135 deg. to the other two cranks. The engines, whether working simple or compound, thus exhaust in exactly the same way as an ordinary 2-cylinder or 4-cylinder simple locomotive. We know of no 4-cylinder simple locomotive having the crank setting that you mention.

[Reply to A. A. LAMBERT.]

"King Arthur" Class Engines, S.R.

In the engines of the "King Arthur" class the Urie tapered boiler has not been perpetuated. Rebuilt engines of the "330" type retain their 6-ft. driving wheels; maximum speeds in excess of 80 m.p.h. have been by no means uncommon west of Salisbury with these and other 6-ft. engines of the Western Division, S.R. Mr. Allen has been taking some observations of running over the Somerset and Dorset line recently, and hopes he may be able to find some room for the logs in his articles during the present year.

[Reply to J. C. ELWES.]

French Railways.

All the French railways have relations with the State of a rather more close character than is the case with our own railways, in that the respective companies are more particularly operating concerns. Provisions have, therefore, been made whereby, at specified dates, the State is empowered to take them over, as it has already done in the case of the Western system. The State lines are, however, the only ones which are also operated on a national basis.

[Reply to F. T. BARWELL.]

The Railway Clearing House.

Obviously, there can be no hard and fast rules as to the allocation of receipts and expenses in regard to the utilisation of running powers, operation of through coaches and trains, and so on. Matters such as those mentioned by you are, therefore, governed by the arrangements applying to each individual case, and, except insofar as they may be handled directly between the companies concerned, are dealt with by the Railway Clearing House.

[Reply to R. C. H.]

Aldwych Spur, L.E.R.

The "Piccadilly" section of the London Electric Railway was originally intended to run from Strand to Finsbury Park, and, in view of the Parliamentary powers concerned, the Aldwych spur was constructed, though it has never been used except as a branch to the main system. Having been constructed for double line, there are, of course, two platforms at the terminus, though, speaking generally, one line only is used, on which a one-car train runs to and fro.

[Reply to D. H. CLEMENTS.]

Tractive Effort.

We have frequently explained that the tractive effort formula takes only into account the dimensions of cylinders, diameter of driving wheels, and working steam pressure of a locomotive, and neglects both adhesion weight and capacity to raise steam (being of very little value, on that account, as a measure of locomotive capacity), and for that reason the respective tractive efforts of a 4-4-0 and a 4-6-0 with identical cylin-

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ders, wheels and working pressures would necessarily be equal.

[Reply to ERIC COPE.]

Cattle Trucks Fitted with Lamp-Brackets.

Provision of lamp-brackets on cattle-trucks would generally indicate that the vehicle in question was intended for use, when necessary, in passenger train formations, but in that event there would need to be also the provision of continuous brake gear, which in one of the cases you mention was absent. The vehicle might be used, however, in "mixed" train formations, outside an ordinary brake-van, in which event a lamp-bracket would be needed on which to carry the tail-lamp of the train.

[Reply to W. H. BARTRAM.]

G.W.R. Distances.

From Westbury to Oxford *via* Chippenham, Swindon and Didcot West Curve is 66½ miles; Oxford to Aynho Junction is 17 miles, 51 chains; Hatton to Bearley West Junction is 5 miles, 44 chains; Bearley West Junction to Cheltenham (Malvern Road) is 32 miles, 55 chains; Mangotsfield North Junction to Bath Station is 10 miles, 14 chains; and Bath (L.M.S. & S.D.J.) Junction to Broadstone Junction is 63 miles, 1 chain.

[Reply to J. G. BOYTES]

Ticket Examination.

Systematic ticket examination, although more troublesome to the passenger than the free-and-easy methods of days gone by, has done an enormous amount towards checking the equally systematic frauds which were practised until these checks were tightened up. We have not found the railway that you favour any less rigorous in its attentions than the other route with which you compare it so unfavourably.

[Reply to "OLD DEER."]

Southern Railway Locomotives.

The 4-6-0 mixed-traffic locomotives Nos. 473–478 and 521–524 are comparatively new engines. Presumably, the 4-4-0 tender and 4-4-2 tank engines which had these numbers have been placed on the duplicate list. The 482–491 series belong to Mr. Urie's first 4-6-0 class. No. 335 is one of the early "Drummond" four-cylinder 4-6-0 locomotives rebuilt by Mr. Urie.

[Reply to C. H. SIMMONS.]

Fastest Run on S.R. (Brighton Section).

You are correct in claiming that the present fastest run on the Brighton section of the Southern Railway is that of the 8.55 p.m. from Three Bridges to Brighton, booked to cover the 21·4 miles in 24 min., at an average speed of 53·4 m.p.h., but would point out that this run was not instituted till October, whereas "Voyageur's" analysis of summer train services appeared in our September issue.

[Reply to GEOFFREY HALE.]

Non-Stop from Euston to Carlisle.

Engines which worked the 420-ton special train non-stop from Euston to Carlisle, 299 miles, on June 19, 1903, were the Webb 4-cylinder compounds 1965, *C. H. Mason*, and 1966, *Commonwealth* and the same engines worked the return train non-stop from Carlisle to London three days later. In their rebuilding as "Renowns" the original Webb tenders were retained.

[Reply to A. H. HORROCKS.]

Back Numbers.

The issue of May, 1922, is out of print. In the course of his articles, Mr. Allen deals at intervals, and usually at least once in each year, with the Great Central route from London to Manchester, so that you may be able to obtain the information you require as to gradients, times, and locomotive performance from more recent "British Locomotive Practice and Performance" articles.

[Reply to "ONE VERY INTERESTED."]

The Fastest British Run.

It was only for the short time that the 7.10 p.m. Paddington to Wolverhampton express called at Princes Risborough, that her run of 51 min. over the 52·6 miles from there to Leamington was the fastest start-to-stop journey in this country. Now that the Risborough slip coach has been reverted to, the 3.45 p.m. from Swindon once again takes the highest place.

[Reply to W. S. BOYCOTT.]

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Stratford-on-Avon and Midland Junction Railway.

This is, presumably, the railway to which you refer. It is now included in the L.M.S. system. A map and particulars appeared in the issues of *The Railway Year Book* prior to grouping. Part of the line, that joining the Midland system near Olney, is used for goods traffic only. The remainder has, however, both passenger and goods services.

[Reply to P. G. CUNNINGHAM.]

Red-Hot Smokebox Doors.

A red-hot smokebox door is an infallible sign that a locomotive is being overworked, with the result that the fuel is not being properly consumed in the firebox, and large quantities of red-hot cinders or partially-consumed coal are finding their way into the smokebox and piling themselves up against the door.

[Reply to COLIN K. DOUGLAS.]

New S.R. Rolling-Stock.

While the new sets of coaches introduced for the "City Limited" trains between London Bridge and Brighton have been specially constructed at Lancing, they represent merely the addition of new vehicles of the latest standards, and do not initiate a new practice in carriage construction.

[Reply to A. L. B.]

Continuous Brakes on the L.N.E.R.

We have no information as to whether any definite decision is likely in the near future as to universal adoption throughout the L.N.E.R. of the Westinghouse or the vacuum brake. This is a matter which can only be settled in course of time. Goods brake vans are being painted brown and lettered N.E.

[Reply to "HOCKERILL HALT."]

L.M.S. Locomotive Classification.

Basis on which this classification was arrived at was fully described in the February, 1924, issue, and we cannot recapitulate the details; we are aware that it has led to some curious results, though they are fully explicable by the method of calculation used, which was strictly dimensional.

[Reply to J. A. TROBE.]

Locomotive Transfers.

In view of the fact that engines belonging to various pre-grouping railways are now being employed here and there on other sections, it is by no means improbable that some of the transfers suggested by you may be made. We have no information as to any present arrangements on the lines indicated.

[Reply to G. E. H. ROBERTS-HAY-BOYD.]

L.N.E.R. Locomotives.

Although some of the new engines built by or for the L.N.E.R. are being numbered in series, many are taking numbers which are becoming vacant owing to the withdrawal of old engines. It is, therefore, unlikely that the class you mention will monopolise a lengthy series of numbers such as that suggested by you.

[Reply to "PUFFING BILLY."]

A South Eastern Query.

When the 8.53 a.m. from Tonbridge to Ashford makes its call at Headcorn, on Tuesdays only, it is due away from there at 9.14 a.m. and due Ashford 9.29 a.m., 4 min. later than normally, so that the run of 10¾ miles is allowed 15 min., and not 12 min., as you supposed.

[Reply to O. T. E. W.]

Manchester's Oldest Terminus.

The oldest terminus in Manchester is the Liverpool Road station, which was the passenger terminus of the Liverpool and Manchester Railway, opened in 1830. Liverpool Road station is now a London, Midland and Scottish Railway goods depot.

[Reply to "SHAP."]

Marlborough Tunnel, G.W.R.

We have already explained that this tunnel has the two lines gauntletted, traffic being controlled by electric train tablet through the section. This is, however, a temporary measure applying while the tunnel is being relined.

[Reply to "KYBALD TWYCHEN."]

The Cost of a Locomotive.

It is extremely difficult to lay down the actual constructional cost of a modern locomotive, but you may take it that a Great Western "Castle" class 4-6-0 could not

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be produced to day for less than £10,000, complete with tender.

[Reply to H. C. L.]

Proposed London and Norwich Railway.

Our recollection does not confirm your view that the scheme for a railway, proposed several years ago, was backed by the Midland Railway. The proposal does not appear to have got so far as depositing a Bill. [Reply to R. T. NINNIS.]

Locomotive Acoustics.

You do not give sufficient detail in your inquiry to enable us to explain the noise made in running by the new 0-6-2 tank engines of the L.N.E.R. to which you refer.

[Reply to "MANCHESTER READER."]

A Record Run on the G.W.R.

We have no information as to the number of the engine which covered the 100 miles from Badminton to Paddington in 91 min., after making a special stop to pick up the Duchess of York.

[Reply to E. W. BAKER.]

L.N.E.R. "Director" 4-4-0 Engines.

The only difference between the improved "Directors" and the previous series is in the matter of externals; the leading dimensions of both series are identical.

[Reply to COLIN K. DOUGLAS.]

Southern Railway Electrification.

We have already referred to the fact that as delay has occurred in regard to the supply of power, the next stage of electrification of the S.E. and C. section has had to be postponed.

[Reply to F. T. BARWELL.

0-6-0 Tank Engines, S.R.

Some years ago the S.E. and C.R. introduced a small class of 0-6-0 tank engine for working light branch trains, and it is, presumably, some of these that you have seen.

[Reply to H. A. BRADBY.]

Night Foreign Mail.

The night foreign mail train leaves Holborn, and runs *via* London Bridge to East Croydon, where it is joined to the passenger train from Victoria (Brighton section) to Newhaven.

[Reply to "WAGON LITS."]

Locomotive Queries.

We have not the information for which you ask, and in any case cannot undertake to answer questions as to the names or numbers of individual engines. *See* rules at head of these columns.

[Reply to "BRIDE OF LAMMERMOOR."]

Weights of Coaches, L.N.E.R. (G.E. Section.)

Old bogie composite main line coaches, with flat roofs, weigh about 24 tons each, and 6-wheeled clerestory lavatory thirds about 15 tons each, empty.

[Reply to A. C. SANDWELL.]

Tube Railway Speeds.

The usual maximum speed of tube railway trains is about 35 m.p.h. The average speed between stations would be from 12 to 16 m.p.h.

[Reply to "TUBE."]

Irish Locomotive Work.

Mr. Cecil J. Allen has not dealt in "British Locomotive Practice and Performance" with the work of Irish locomotives since 1920.

[Reply to T. A. CARSON.]

South Wales Railways.

We have no information as to the possible transfer of the Carmarthen and Llandilo branch from the L.M.S. to the G.W. Railway. [Reply to B. DAVIES.]

Ilfracombe and Minehead Branches, G.W.R.

4-4-0 and 2-6-0 locomotives can work over these branches, but not the 4-6-0 or 2-8-0 engines.

[Reply to D. GARRON.]

Chislehurst to St. Mary Cray.

Distance between these two stations on the Southern Railway (S.E. Section), by the connecting spur, is 2 miles, 39 chains. [Reply to A. C.]

Rebuilt G.W. 4-6-0 "Stars."

We believe you are right in stating that the rebuilt 4-6-0 *Knight of the Golden Fleece* is the first "Castle" to be stationed at Wolverhampton. [Reply to G. P. WILLIAMS.]

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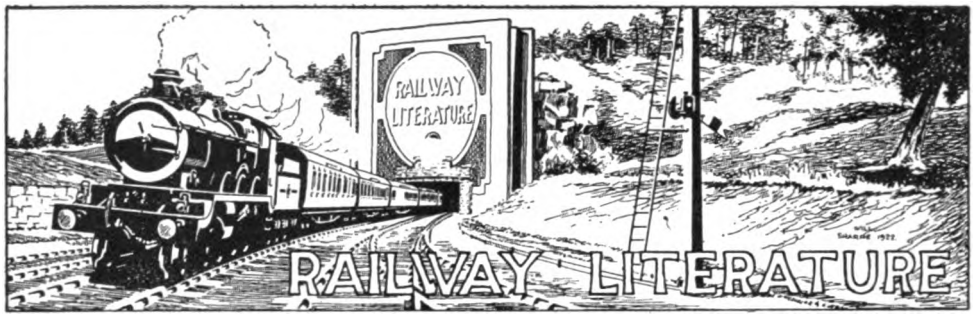

RAILWAY ACCIDENTS: LEGISLATION AND STATISTICS, 1825 TO 1924. By H. Raynar Wilson. [Published by the Raynar Wilson Company, 96, Hurlingham Road, London, S.W. 6. Price 6s.]

The author of this booklet will be well-known to most of our readers, in that, after occupying for some years the position of Signal Engineer to the late Lancashire and Yorkshire Railway, he has for a number of years past contributed regularly to various engineering and railway publications, besides being the author of several works on railway signalling and in regard to the safe working of railways. The booklet has large pages, to permit of the inclusion of a number of charts, diagrams, and tables requiring greater space than would have been available had a smaller sized page been adopted. As explained in the preface, its main object is to bring out more clearly than is practicable by the mere study of statistics "the immensity of the freedom from accident that British railways enjoy"; to render tribute to the services of railwaymen in carrying out large-scale operation, with all its complexities, with so remarkable immunity from fatal or other accident; and to indicate the nature of the control which the Government has over railways in regard to public safety, the manner in which the Government inspecting officers of railways have performed the duties placed upon them by Parliament, and the services rendered by inventors and makers of safety appliances and railway equipment. As the author points out, during the five years 1920–24 the proportion of passengers killed in train accidents was one in 166 millions, and of those injured, one in 3½ millions. He contends, however, and advisedly, that this is not the true criterion of safety, which requires consideration of all accidents, great and small, and with and without personal injuries. During the same period of five years there was one collision, in which a passenger train was concerned, for every 3½ million miles run, and one passenger-train derailment for every four million miles. He compares this with the situation forty years ago, when there was a collision for every 1¾ million miles and a derailment for every 2¼ million miles. There are three chapters, the first describing "the purpose of the work," the second giving a very complete and useful history of legislation in regard to safe railway working, while Chapter III explains the nine tables, analysing accident causes, accident statistics, &c., in very full detail. There are also two charts, one indicating graphically the growth of train mileage and numbers of passengers during the period 1875–1924, and the other setting forth numbers of route miles, train miles per route mile, and tonnage per route mile, from 1875 to 1913. The volume concludes with a four-page synopsis and index, prepared on a somewhat novel and distinctly useful basis, rendering reference to any matter particularly convenient.

The volume is well printed and, apart from its intrinsic interest, should be very useful as providing a convenient source of reference in regard to railway safety legislation, accident statistics, &c.

THE LONDON AND NORTH EASTERN RAILWAY. By G. E. Mitton. [Published by A. and C. Black, Limited, 4, 5 and 6, Soho Square, London, W.1. Price 2s. 6d. net.]

This book, one of a series originally issued in 1911 under the heading of "Peeps at Great Railways," although to some extent ranking as a second edition of the volume which dealt with the Great Northern and North Eastern Railways, is now extended to cover the whole of the L.N.E.R. It is, of course, designed for purely popular reading, and, while a certain amount of railway information is included, special attention is given to matters of historic and tourist interest in regard to places served by various sections of the L.N.E.R. A short introduction sets forth the changes produced by grouping, while the first chapter gives a number of principal facts in regard to the growth of the railways now included in the L.N.E.R.

Following chapters deal with sections of the system, and although, in the main, the rest is of a descriptive, historic and tourist character, various incidental references to

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railway methods and other matters are included. The book contains eight colour plates, one showing an L.N.E.R. express on Durham Viaduct, while the wrapper shows a further train view in colour. The others are all of a scenic character. Numerous sketches, many of railway interest, appear in the general text. From the descriptive point of view, Miss Mitton has produced a very handy and interesting book, though a few of her railway references are somewhat questionable. Thus, it is not usual to refer to *Locomotion* by the name of *Puffing Billy*, though that name has been used for it. The true *Puffing Billy* is, however, the Blackett and Hedley engine, now in South Kensington Museum. On page 11, the reference to the effect of the Forth and Tay Bridges in giving the East Coast route "a free road beyond Edinburgh" in 1885, does not agree with the more correct references to the Forth Bridge later on, while the 1888 "Race" was to Edinburgh and not to Aberdeen, to which the route was not then available. Similarly, it is not until a good many miles north of Dundee—at Kinnabar Junction, to be precise—that L.N.E.R. trains pass on to the L.M.S. for the final run of 40 miles or so to Aberdeen. On page 56, the authoress is mistaken in referring to Gleneagles as an L.N.E.R. golf course. It was, of course, late Caledonian, and now L.M.S. Although the main platform at Cambridge ranks as one of the very long ones in the country, there are several which exceed it in length.

THE SOUTHERN RAILWAY. By G. E. Mitton. [Published by A. and C. Black, Ltd., 4, 5 and 6, Soho Square, London, W.1. Price 2s. 6d. net.]

This is a second volume, corresponding to that reviewed above, and although dealing with the Southern Railway, ranks as a second edition of a book published in 1912 dealing with the South Eastern and London, Brighton and South Coast Railways, with, however, additional chapters and new illustrations. The wrapper includes a view of a "King Arthur" class locomotive at a station platform, while the frontispiece shows a train emerging from Shakespeare Cliff tunnel, Dover. Seven further colour plates are of a scenic character. Here, also, the text is mainly descriptive, with particular reference to matters of historic and scenic interest, though sketches in the book and incidental references justify the inclusion of the volume in railway literature. In two or three places, however, Miss Mitton is somewhat weak on her railway facts. Thus, on page 16, a sketch, presumably intended to show *The Southern Belle* from Victoria to Brighton, but carrying an out-of-date head code, is described as "An Express to the South-West." On page 42 it is suggested that the South Eastern and Chatham system goes on from Holborn Viaduct to Moorgate Street. We note the omission of any mention of electrification, except in regard to the "Brighton" section. Otherwise, we have no doubt that this volume, together with that previously reviewed, will be welcomed by many of our readers.

RAILWAY AND CANAL TRAFFIC CASES, Vol. XVIII. By W. A. Robertson, B.A., and W. S. Kennedy, LL.B. [Sweet and Maxwell Ltd., 2 and 3, Chancery Lane, London, W.C.2. Price £1 12s. 6d. net.]

This, the 18th volume of Reports of Cases decided by the Railway and Canal Commissioners and the Railway Rates Tribunal, published by Messrs. Sweet and Maxwell Ltd., covers the period 1923-25. It represents one of those useful publications requiring to be frequently consulted in legal circles. The digest by which it is prefaced indicates in outline the points which arose in the course of the proceedings dealt with.

BULLETIN No. 10 OF THE RAILWAY AND LOCOMOTIVE HISTORICAL SOCIETY (U.S.A.) maintains the quality and interest of its predecessors. It includes articles on early Baltimore and Ohio locomotives, engines of the Long Island Railroad, and products from the Norris Locomotive Works, together with an article by Mr. G. W. Bishop on the Norris engines which worked on the Birmingham and Gloucester Railway in early days. Reference is also made to the Railway Centenary. Particulars of the Society can be had from Mr. G. W. Bishop, English representative, whose address is 57, Warwick Road, Kenilworth, Warwickshire.

QUESTIONS AND ANSWERS IN FIRST AID. By F. G. Harwood. [Published by John Bale, Sons and Danielsson Limited, Oxford House, Great Titchfield Street, London, W.1.] These publishers send two little booklets, one including "Questions and Answers in First Aid" on a general basis (price 6d. net), and the other in the shape of a folding map (sold at 3d.) dealing more particularly with the rendering of "First aid" to footballers and other athletes.

THE Pennsylvania Railroad, U.S.A., send through Mr. W. Bryde, of 20, Water Street, Liverpool, their "special agent" in England, a copy of their 1926 calendar. It includes a colour reproduction of the "Broadway Limited" express, under the caption "Speed and Security," with monthly tables attached.

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A reminder is also included that this year there is to be held in Philadelphia a sesquicentennial exposition in celebration of the 150th anniversary of the United States and the 80th year in the history of the Pennsylvania Railroad.

BRUNEL AND AFTER. By Archibald Williams. [London. The Great Western Railway Company. Price 1s.]

"The Romance of the Great Western Railway," the sub-title of Mr. William's book, describes appositely the interesting fare contained in the volume. That it should be possible to touch, even in the briefest manner, upon so many of the salient points in Great Western Railway history, without the book being merely a synopsis, s greatly to the author's credit. Although not apparent to the present generation, for at least two decades, "Brunel" and the "Great Western Railway" were almost synonymous railway definitions. Brunel, as an engineer, has interest outside the Great Western Railway and its associated lines—the monster *Great Eastern* steamship, for instance—but it is his broad gauge railways that entitle him to fame. Bristol had the greater share of responsibility for the Great Western Railway, and the circumstance that the younger Brunel was the engineer for the Clifton Suspension Bridge, made him known to the Bristol Committee of the Great Western Railway, and helped to secure him the position of Engineer to that railway. He was then 27 years of age. Railways in 1833 were as much in the experiment stage then as were road motors 60 years later, and it is not surprising that Brunel, young and ambitious, should strike out with a system of his own. So the Great Western Railway had the broad, or 7-ft., gauge. High speed was promised and special types of locomotives, not altogether satisfactory, were evolved, but when Daniel Gooch was appointed Locomotive Superintendent designs that became standard were produced, and his "Lord of the Isles" class, a type of engine unsurpassed for sterling locomotive design, held sway practically till the passing of the broad gauge. Brunel was also an ardent supporter of the atmospheric system. A portion of the South Devon Railway was constructed to be worked on this principle, and the system was in use for several months. Brunel, however, afterwards decided against the atmospheric system.

Mr. Williams takes his readers from London to Penzance; over the various railways associated with the G.W.R.; to the extremity of South Wales (where Brunel at first decided upon Fishguard as the terminus, although the line was ultimately constructed to Milford Haven instead) and touches on the developments to the north-west of England and to the Dorset coast. Two chapters are devoted to the broad gauge—the battle and the conversion. Brief reference is made in another chapter to the remarkable work performed by the G.W.R. in the War of 1914-18. The ninth chapter describes in outline the stories of the railways—chiefly Welsh—that were grouped in the Great Western system under the Act of 1921. The following chapter draws startling comparisons between the luxurious railway travelling and extensive facilities as existing to-day on the G.W.R., and the conditions under which our grandparents and their children travelled on the same system.

Sixteen pages of facts, figures, dates, and an index complete this absorbing outline of G.W.R. progress. Some 78 illustrations add considerably to the interest of "Brunel and After."

THE Royal Mail Steam Packet Company's calendar for 1926 is one which will, no doubt, be exhibited by all who may have the good fortune to possess it, in view of the interest of the colour illustrations that adorn each of the well-printed and neatly designed monthly pages. The colour views in question all have an historical subject matter, as indicated by the following list of designations: Constantinople throughout the ages; Algiers, at one time the home of the pirate; Old Panama, through which the Spaniards brought the wealth of the Pacific; Magellan discovers the route to the Pacific; Canada, coming of the white man; Algeciras in the sixteenth century; Norway, Viking ships; Rio de Janeiro, Spanish galleons; Landing of Columbus, 1492; Cartagena, the chief city on the Spanish Main; Early Traders in South America, the Santos River; and a Maltese galley. These views, all including old time vessels in appropriate surroundings, provide a thoroughly interesting picture gallery.

WE have received from Messrs. Richard Tilling, general letterpress and lithographic printers, of 106, Great Dover Street, London, S.E. 1, a copy of their calendar for 1926.

MESSRS. ALF. COOKE Limited, art colour printers, Leeds, send a handy wall calendar; also a good specimen of colour printing.

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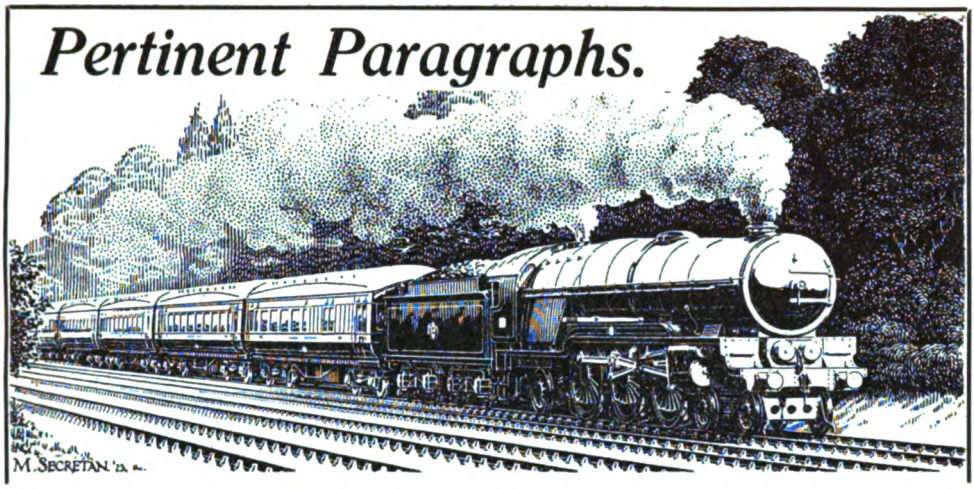
Pertinent Paragraphs.



British Manufacture Stipulations in Railway Contracts.

THE L.N.E.R. has announced that they have decided to insert a clause in all future contracts for goods produced from manufactured steel that these " must be of British manufacture from steel of British manufacture throughout." This will affect all such articles as carriage and wagon axles, tyres, springs, buffers, &c. Following statements to this effect, officials of other railways have explained their policy in this connection. In the case of the L.M.S.R. the following statement was issued :—

" It has, for some time past, been the custom of, at any rate, the large British railways, to insert a clause in contracts that manufacturers shall use only British steel and other British materials in the construction of rolling-stock and other equipment for the railway. In 1925 British industry benefited from this custom to the extent of many millions of pounds. For instance, it has been the fixed and definite practice of the L.M.S. Railway for years past to use only home-manufactured material, very often purchased at higher prices than suitable foreign material, in all its workshops, factories, &c., and nothing is purchased outside the country except such things as timber, which is not grown at home."

A Southern Railway official explained that this had always been the policy of the company since its formation. Everything in the way of steel purchased by the company for their electrification schemes, new locomotives, rolling-stock and station extensions had been purchased in this country, and that policy would be continued in the future.

It was stated at Paddington that the G.W.R. had also adopted the same policy for some time past, and that steps had recently been taken to revise contract specifications to safeguard the position.

Mr. George Hughes.

IT is usual when a railway officer retires especially when he has held office for a considerable number of years, that a presentation shall be made to him from the staff and others who have been associated with him. In the case of Mr. George Hughes, C.B.E., who recently retired from the position of Chief Mechanical Engineer of the L.M.S.R., after holding a similar position in regard to the late Lancashire and Yorkshire Railway for a considerable period, we can readily imagine that a fund raised for the purpose of a retiring presentation would realise a substantial amount, particularly in view of the very high regard which all who had to do with him entertained for Mr. Hughes. Mr. Hughes expressed a desire that, instead of receiving such a presentation himself, the sum raised should be devoted to the foundation of an annual prize fund in his name in connection with the Railway Mechanics' Institute at Horwich. Consequently, a meeting was held recently at Horwich, when Mr. G. N. Shawcross, Mechanical Engineer, Horwich, handed over to Mr. Hughes, as a preliminary to allocation for the purpose indicated, the sum which had been subscribed on behalf of the staff, expressing in suitable terms their esteem and gratitude for the work Mr. Hughes had done as their chief. At the same time, a bracelet watch was presented to Mrs. Hughes as a memento of her work among the staff at Horwich.

L.N.E.R. Musical Society at Queen's Hall.

EVER since the inauguration of a concert devoted to carols and other Christmas music two or three years ago, the performance at Queen's Hall has become almost as popular as the annual concert in the spring, previously the special event of the year, so far as the Society was concerned. The concert given

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on Saturday, December 19, proved to be no exception, the hall being filled to capacity and the proceedings as a whole arousing great enthusiasm. As usual, the Society was represented by its full orchestra of 100 and a male voice choir, numbering 300, drawn from Cambridge, Ipswich, King's Lynn, London, Norwich, Peterboro', York, &c., and, also as usual, the concert was conducted by Colonel William Johnson Galloway, a director of the L.N.E.R., and an enthusiastic musical amateur, to whom the Society is indebted for its foundation. Colonel Galloway thus completed a record of having conducted at all but one of the performances, of which that under notice was the 132nd, since the Society was established in 1908. The soloists were Miss Flora Woodman and Miss Molly O'Callaghan, while Dr. Stanley Marchant, Mus.Doc., together with Mr. Sydney Harrington, F.R.C.O. officiated at the organ, the latter assisting also as accompanist.

While several of the items were of a general character, special interest attached to the Bach chorales and other items rendered by the choir, to the carols, old and new, in some of which the audience was invited to join, to choruses from "The Messiah" ("For Unto Us a Child is Born" and the "Hallelujah"), arranged for male voice choir, and, of course, to the work of the orchestra, both in their own items and in accompanying solo or chorus selections. Mention may also be made of the fact that Miss Flora Woodman sang the well-known aria from "Samson," "Let the Bright Seraphim," the trumpet *obbligato* being played by Mr. H. Barr.

Difficulties of Tunnel Operation.

An incident reported from Switzerland, where the enginemen of a steam-operated train became unconscious in a tunnel, owing to the fumes and gases generated by their engine in the attempt to work a heavy load through the tunnel, brings to mind that in earlier years instances of this kind were by no means unusual, particularly in the case of long tunnels on steep adverse gradients. When some of the long Alpine tunnels were steam-operated it was, in fact, found necessary to equip engines with air reservoirs to which the enginemen could resort if need arose while on some of the United States mountain routes special measures on similar lines have had to be taken to provide against results of this kind. The difficulty applies more particularly in regard to long single-line tunnels, and has been accentuated by the increased loading of trains and the use of very big and powerful locomotives. It is true that engines should never be so far overloaded that they cannot get through a tunnel in scheduled time, but occasionally trouble may arise, and it will readily be understood that, should serious slipping result, or the time occupied in traversing the tunnel be substantially lengthened, the conditions may easily become so serious that there is nothing surprising in the fact that occasionally the enginemen may be rendered unconscious. In the case under notice, help was sent out when it was found that the train did not arrive, though artificial respiration had to be resorted to in order to revive the men.

Colours of French Locomotives.

Mr. R. Greiffenhagen points out that certain clerical and other inaccuracies in the reply published in the November number have tended rather to confuse the information then given. Thus, in line 14, the word "water" is an obvious clerical error, and should be "number." In the case of the Midi Railway, it should have been stated that there is no number on the buffer-beam. In regard to the Nord Railway, the number appears in a label frame above the coupling hook. On the Midi Railway the buffer-beam is plain black, the label "MIDI" being carried on a plate in front of the funnel. On the Est and P.L.M. the buffer-beams are lined as on the Alsace-Lorraine Railway. Mr Greiffenhagen further explains that, on the Alsace-Lorraine line, only covered Westinghouse-fitted wagons are painted green, thus matching the passenger rolling-stock.

Accident at Sheffield.

On September 19, at Victoria Station, Sheffield, L.N.E.R., while the 1.30 p.m. passenger train from Cleethorpes to Manchester was standing on the down main platform line it was run into in the rear by the duplicate of the 3 p.m. passenger train from York. The collision appears to have taken place at quite a low speed and under exceptionally bad weather conditions. As a result of the collision six passengers were removed to the Royal Infirmary for attention, five of these being subsequently allowed to leave and proceed to their destinations. The damage to the stock was for the most part inconsiderable, seven of the vehicles of the standing train being more or less affected, the damage being, as is to be expected, most pronounced in the case of the last vehicle. Neither the engine nor any of the coaches of the colliding train was damaged. The 1.30 p.m. train from Cleethorpes consisted of 11 six-wheeled passenger coaches with engine attached. The duplicate train from York was drawn by engine No. 699, 4-4-2 class, and consisted of seven

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eight-wheeled bogie coaches, weighing altogether 179 tons. The engine was fitted with the Westinghouse brake and the train with the vacuum brake, both engine and train brakes being simultaneously controlled.

Permissive Working.

REPORTING upon the accident, Major G. L. Hall remarks that there can be little doubt that this accident was primarily due to the fact that the driver of the York train entered the station under the mistaken impression that the platform road was unoccupied. From his evidence and that of his fireman this impression is accounted for by the clear aspect of the signals exhibited when they first came into view, and by the omission therefore of the initial check at the outer home signal, which is the first and most important item of the regulation governing this permissive working. He sees no reason to doubt the accuracy of this evidence, particularly in view of that of the signalman, who was admittedly doubtful as to the exact whereabouts of the train when he pulled the signals off. In regard to the failure of the second precaution, that is the warning prescribed to be given at the signal box, the presence of the light engine and the particularly bad weather conditions are, he thinks, sufficient to account for driver Thompson's inability to see the green flag; and, further, he received no verbal warning owing to the fact that the signalman was prevented by his other duties from giving this.

A degree of responsibility is also attributed to signalman Beever. It is pointed out that "the worse the conditions are, the more important it is to comply strictly with instructions." The signalman, therefore, should have made sure that the York train came actually to a stand before lowering the signals. The driver of the York train is not blamed for failing, in the circumstances, to see the standing train in time to avoid the collision. The inspecting officer, while approving generally of the signal arrangements, suggests that calling-on signals should be added on the bridge which carries the inner home signals, in order that a driver may receive, by the use of a distinctive signal, a definite warning that the road is occupied between one signal and the next.

Kentish Railway Tunnels.

IN view of an enquiry dealt with in "The Why and the Wherefore" section in the November number, a Cambridge reader has taken the trouble to estimate the length of all tunnels in the county of Kent above a quarter of a mile long. Where exact particulars are not available, the measurement is made on an approximate basis, with the aid of an Ordnance map. The list is given below. It will be noted that there are 28 tunnels, four being within the London area, while the total length is some 20 miles. Further, the 17 longest average a mile in length. It is pointed out further that, although the "Brighton" section of the Southern Railway has a large tunnel mileage, only one tunnel of any substantial length is in the county of Kent.

	Miles.	
Strood	2¼	
Sevenoaks	1⅞	+
Shepherdswell	1⅞	—
Polhill	1½	
*Sydenham	1¼	
Abbots Cliff	1⅛	
*Lee	1	
Ramsgate	⅞	
Buckland (Dover to Ramsgate)	¾	+
Shakespeare	¾	
Cowden	¾	
Elmstead	½	
Eynsford	½	
Gillingham	½	
Sandling	½	
Tunbridge Wells (N)	½	—
Canterbury (Canterbury and Whitstable Railway)	½	—
Folkestone Warren	⅜	
Knockholt	⅜	—
Dover	⅜	—
Maidstone	¼	+
*Greenwich	¼	+
Tonbridge	¼	
Tunbridge Wells (S)	¼	
*Kidbrooke	¼	
Chatham (W)	¼	
Chatham (E)	¼	
Bishopsbourne	¼	

28 tunnels, total length just over 20 miles.
* In the London area.

Reconstructed Coaches, Central London Railway.

RECENTLY we were enabled to inspect one of the older-type coaches belonging to the Central London Railway, which has been reconstructed and modernised as a model to which remaining vehicles will eventually be made to conform. It is expected that these will be completed within a period of eighteen months or less, and that several complete trains of the new vehicles will be in service by Easter this year. The older coaches have suffered seriously from the fact that they had end doorways only, and those of comparatively small dimensions, though a few of the motor-cars had a doorway adjacent to the motor compartment, so that

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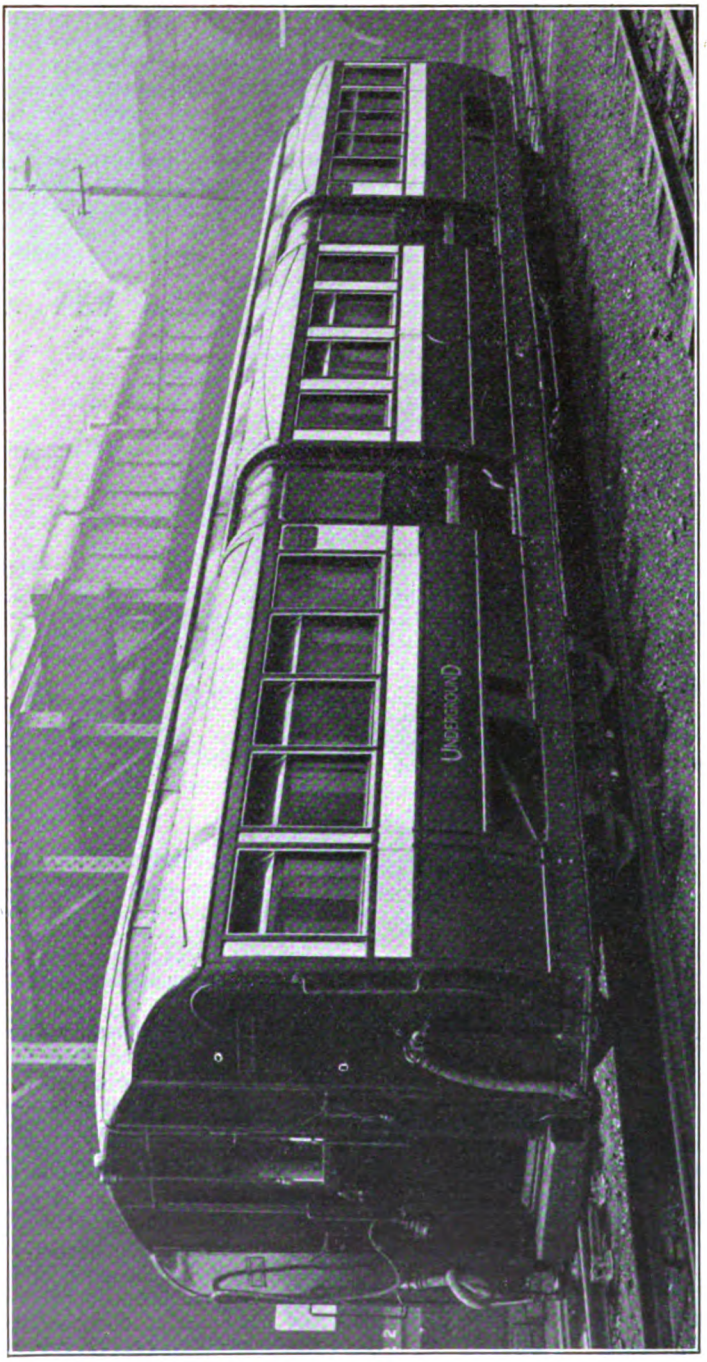

RECONSTRUCTED ELECTRIC COACH, CENTRAL LONDON RAILWAY.

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they had one door only on each side for passenger entrance and exit.

The new coaches will each have two 3 ft. 6-in. doorways equi-distantly spaced along each side, the design being generally on the lines already adopted for new rolling-stock in use on sections of the London Electric Railway. Seating has also been newly designed, while the lighting and ventilation will be in accordance with the latest standards. The doors, as usual for new "Underground" tube stock, will be fitted with pneumatic opening and closing devices, so controlled that until all doors are closed current cannot be applied to the traction motors. The open platforms hitherto provided at the ends of the coaches are being enclosed, and improved ventilation is being provided in the clerestory. The new trains will be made up to a 7-coach standard, three vehicles being equipped with motors instead of two, as hitherto. In combination with the reduction of time at stations, particularly during busy periods, it will be practicable to reduce materially the throughout journey times and thus to permit of the running of increased train services to meet "rush" requirements.

"King Arthur" Class Locomotives.

MR. H. J. FINCH sends the following note, which may be of interest to those of our readers who have wondered why certain of the names chosen for locomotives of the "King Arthur" class on the Southern Railway were afterwards changed in favour of others. Regarding No. 788E he says: "Sir Beaumains, arriving at King Arthur's court as an unknown youth, was employed for three years as a scullion, and named Beaumains in derision by Sir Kay on account of his white hands. Later he became a knight and was recognised by Sir Gaheris as his missing brother Gareth. Thus Sir Beaumains and Sir Gareth are one, and the change of name of No. 788E to *Sir More of the Mount* is explained." Our correspondent further adds: "Why 767E was ever named after the traitor Sir Mordred is a mystery! Luckily it is now *Sir Valence*."

Broad-Gauge Express Locomotives, G.W.R.

COMMENTING upon various paragraphs which have been published lately as to speed work by broad-gauge engines on the G.W.R., Mr. W. H. Robson writes as follows: "In reference to the opinion of the late Mr. Rous Marten regarding the alleged speed records of the broad-gauge single-wheel engines, this gentleman apparently had his experience with them in the 'eighties, when coal saving on the G.W.R. was rampant, drivers making any excuse for losing time and thus saving coal; also excessive speed was not officially allowed. My father, who was an express driver on the G.W.R., at Bristol, from 1876 to 1896, on both the broad and standard gauge, was officially reprimanded, on several occasions, for running at excessive speed down Wellington Bank and over other favourable parts of the system. The main design of the broad-gauge express engines was in accordance with the best practice of the present day, these engines having very large boilers with large and wide grates, large steam pipes and steam chests, also cylinders 18 by 24 in., with steam ports 13 by 2 in., and blast pipes 5¾ to 5⅞ in. in diameter at the orifices. The areas of the blast pipe orifices were as large as those of the steam ports, and this fact is a reliable indication of the high efficiency of these engines and their boilers; also, I think, there is nothing on the road, at the present time, that can show such a large ratio of blast pipe area to that of the cylinder. It was a treat to hear the exhaust beat of these engines, also to see them getting a train away, and I feel convinced from what I know of these engines that with the load of about 50 to 60 tons behind the tender they were fully capable of running from Paddington to Didcot in 47 minutes, if put properly to work. I was serving my apprenticeship to engine-fitting on the G.W.R., at Bristol, in the 'eighties, so am fully conversant with the design of these famous engines and what they were capable of then doing; also with the footplate practice at that time."

Naming Goods Trains.

REFERRING to a "Pertinent Paragraph" under this title published in the September issue, Mr. J. C. Woollven, writing from Florida, U.S.A., explains that the names *Rocket*, *Comet* and *Blue Goose* are probaby adopted to indicate speed. The goose is one of the fastest birds, often attaining 60 m.p.h. while flying, and frequently passing express passenger trains. He further explains that *Man o' War* is a famous race horse, while *Spark Plug* is an imaginary race horse appearing in comic pictures in various newspapers.

Government Control in the Argentine.

GOVERNMENT control over railway working in the Argentine is of two kinds, applying firstly to operation and working, and secondly, as will be seen from the following remarks, based on particulars sent in by an Argentine reader. Amongst the former it may be mentioned that the railways have to send to the Ministry of Railways a copy of every new time-table ninety days before it comes into operation. During the three months the Min-

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istry can consider the proposed alterations, and see how they affect travellers. Cases are known of the Ministry insisting on additional trains being provided than those shown in the deposited time-table. On the other hand, time-tables have to be available to the public 21 days before they come into operation, so that the convenience of travellers is well looked after. Speed of trains is restricted on the metre gauge to 35 miles an hour, and on the broad gauge to 45 miles per hour, but if the permanent way, gradients, curves, rolling-stock, &c., permit, higher speed may be sanctioned by the Ministry, as has been the case with the Central Argentine Railway's expresses between Buenos Ayres and Rosario. These trains cover the 188 miles between these towns in 4¼ hours, which means that they must travel at 54–58 miles per hour over certain sections. Booking-office windows have to be opened for 29 minutes for each train—from 30 minutes to 1 minute before departure of the train. Although British railways are restricted to a minimum width of seat for third-class passengers, in the Argentine not only is the minimum size of seat for both first and second-class passengers laid down by the Government regulations, but the minimum amount of space per passenger to be provided in each coach is also published.

Margin of Lateness for Trains.

LOCAL passenger trains are allowed five minutes' grace for each 30 miles, and mixed trains 10 minutes for the same distance, but for long-distance trains, the total lateness allowed in a journey of 200 miles is 30 minutes. As mentioned below, the penalties on the railways for breach of the regulations are severe, and therefore the companies have to watch that the Ministry does not speed up very much the timing of the trains, as shown in the submitted time-tables; otherwise the trains are likely to be late, and penalties may be incurred. The Government recognises the difference in the intensity of labour performed at stations with much, little, and lesser traffic, and justly regulates the hours of employees accordingly. The daily hours of labour may be 8, 10 or 12, whilst guards and enginemen may serve 8 or 10 hours a day, according to the character of the trains they work.

Excess Fares.

LONG DISTANCE passengers travelling without previously obtaining a ticket are charged 25 per cent. in excess of the usual fare, but if they inform the guard when joining the train that they have no ticket, the excess fare is only 10 per cent. The penalties do not apply to local trains, and many passengers travel without tickets in the hope of escaping payment, of which they have a good chance, as most of the stations are "open." On the other hand, if a traveller with a second-class ticket cannot find a seat in a second-class carriage, he is entitled to travel first-class without being excessed; similarly a first class passenger, who has to travel second class, is refunded the difference. But if a first-class passenger, for whom no seat is available, prefers to stand in the corridor of a first-class coach, he must pay first-class fare.

Complaint Books at Stations.

REMINISCENT of the commencement of British railways is the "complaint book" that has to be kept at each railway station in the Argentine; the stations also must be placarded with a notification that there is a "complaint book" available for passengers' use. A complainant has to sign any entry he makes in the book, and a witness has also to sign. Copying ink pencils are used, as four copies are taken from the entry in the book—one each for the Railway Ministry, the Government Inspector for the section of railway, the head office of the railway company, and the Chief Traffic officer of the railway. It looks as if there is no chance of the complaint failing to receive attention. The railways are subject to heavy penalties for offences against the regulations; in some cases as little as £50, and in others as much as £1,000. For continuing offences the penalties are set forth on a per day basis.

The Hope Accident.

THIS accident occurred at Hope Station, on the Dore and Chinley section, Midland Division, of the London Midland and Scottish Railway. The 3 p.m. up express passenger train, Manchester Central to Sheffield, travelling at high speed under clear signals, collided head-on with a stationary down ballast train which had just previously been shunted from the down to the up line for the purpose of permitting a following down mineral train to pass. As a result Driver G. Wolfe and Fireman J. R. Henderson, of the express, and Platelayer J. H. Chapman, one of a gang of men employed with the ballast train, succumbed shortly afterwards in hospital. One passenger was seriously injured, while nine others, the guard of the ballast train and two platelayers, received minor injuries or suffered from shock. It was fortunate that the express was lightly loaded, and that the brake compartment of the first coach was leading. The express was drawn by 4-4-0 locomotive, No. 384, and the ballast train worked by 0-6-0 locomotive, No. 3773.

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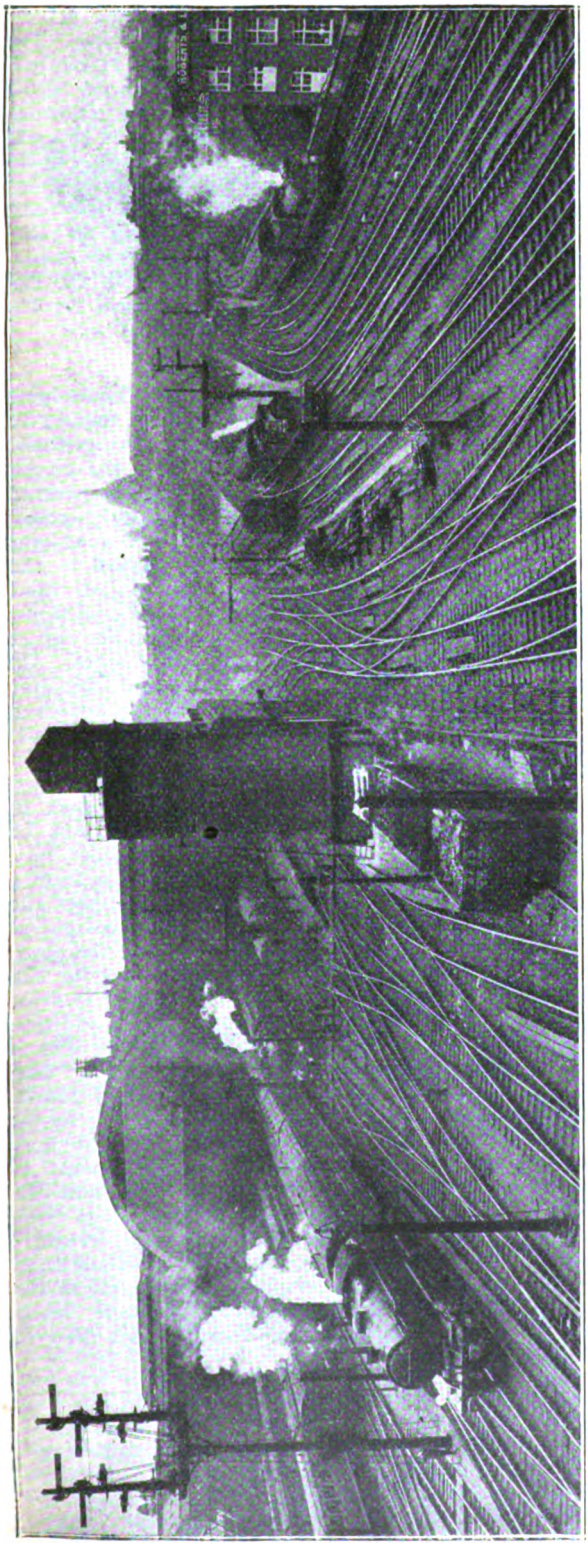

THE EVENING RUSH FROM LONDON BRIDGE, S.R.

This remarkable view, reproduced from "Tales of the Trains," published by the Southern Railway (*see* "Railway Literature"), was taken from "B" box at 5 p.m. The unusual feature is that it shows both the "Brighton" and the South Eastern & Chatham stations in one photograph.

Principal responsibility for the accident is laid upon signalman Adams. He frankly admitted his failure, which was of a serious type, and in the extraordinary circumstances described can only be accounted for as the result of a lack of concentration of mind upon the traffic he was handling, finally causing lapse of memory when pressure of work was perhaps a little above normal. The only explanation he was able to offer was that he was busy with the reception of a telegram for Signalman Green at the adjacent box at Bamford which he was handling with a view to transmission, by telephone, to Bamford, in order to assist Signalman Green, who could not read the telegraph. The arrangement was a private one and, in the circumstances, unique so far as the Company's officers were aware. It is true that Assistant District Controller Mitchell had certified Signalman Green fit for his duties, and admitted having failed to ascertain whether Green could handle the telegraph instrument within a reasonable time of his assumption of responsibility for the Bamford signal box. Green, however, recognised that telegraph work was part of his duty. He had been at Bamford for 3¾ years, and was spoken of highly as a signalman.

The Inspector's Recommendations.

LIEUT.-COL. A. H. L. MOUNT concludes by expressing the opinion that Signalman Adams lack of concentration upon the traffic being handled at the time, which in the circumstances was sufficient to cause forgetfulness and account for this head-on collision, would not have

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had this serious result if the additional safeguards afforded by the "blocking-back" bell signal and the lever collar had been in operation. Under similar conditions, therefore, and where track circuit, performing the same functions, does not exist, the case indicates the necessity for reconsideration of the general applicability of this bell signal, and the provision and use of the collar for the protection of shunt movements such as that of this ballast train.

He adds the following suggestions calling for the attention of the Company :—

(*a*) The necessity for adequate lie-by accommodation, having regard to traffic conditions, in order to minimise the shunting user of the main line.

(*b*) The regularisation of the extent, even for a limited period, by which one man—under the system of certification of fitness for a signalman's duty —may perform telegraph work for another.

(*c*) The desirability of the gradual substitution of the telephone for the telegraph under conditions such as those obtaining at Hope.

The Llandudno Accident.

In the accident which occurred outside Llandudno Station on October 12 as the 9.10 a.m. ex Llandudno Junction down passenger train was approaching the station under clear signals and about to enter No. 4 platform, the 9.20 a.m. rail motor train, then due to depart, started from No. 3 platform against signals at danger, with the result that a side-long collision took place at the point of convergence of the platform lines concerned. The former train was well filled and contained a number of school children. Seven passengers were seriously injured, of whom one child was reported to be in a critical condition. Twelve other passengers, Driver J. Pritchard and Guard Jones, of the rail motor, received minor injuries or were shaken. The majority of those seriously injured suffered from leg fractures as the result of the corner of the frame of the leading coach of the rail motor penetrating at seat level the sides of the two rear coaches of the incoming train. The rail motor comprised tank engine No. 760 marshalled in rear, type 2-4-2, weight 45 tons 18 cwt. in working order, pushing eight-wheeled bogie motor-trailer No. 5345 and motor driver-trailer No. 7984, weighing 49 tons. The length of the rail motor was 142 ft. overall. The passenger train was drawn by 0-6-2 tank engine No. 611, running chimney leading, type 0-6-2, weight 43 tons 15 cwt., and consisted of three six-wheeled coaches marshalled in front, followed by two four-wheeled coaches, total weight 63 tons. Driver J. Pritchard, a man nearly 69 years of age, with 50 years' railway service except for a few months, was in charge of the rail motor. His son, R. Pritchard, was driving the incoming train.

Motor Train Operation.

Reporting upon the accident, Lt.-Colonel A. H. L. Mount considers that the driver of the motor train when he received the "right-away" instructions from the guard, who was travelling in his compartment of the motor train, "subconsciously relied upon Morris," assuming that the road was clear and paying no further regard to the signals. The inspector pointed out that Pritchard's record is particularly creditable, and this accident, which comes at the end of his long service, is most unfortunate. Up to 1921 he had been employed on main line expresses, and, in spite of his age, appeared to be perfectly fit to handle the light rail-motor service upon which he was subsequently employed. He frankly acknowledged full responsibility for the accident, and, in fact, requested that no blame should be attached to Guard Morris. He does not, however, agree to free Guard Morris from a measure of responsibility and expresses the opinion that had he been paying the slightest attention to his duty of observing the road, he had, in the time available during the run up to the signals, ample opportunity to draw attention to his driver's mistake, in addition to the completion of his journal, even if such had necessarily to be carried out at that moment. On the general question of guards riding in the driver's vestibule of the motor trains, the inspector admits that it may not be disadvantageous for the guard to accompany the driver providing that he realises his own responsibility for safe train working. In this case he would certainly have been of more use in the vestibule than in his own compartment immediately in the rear. Certain other comments were made by the inspector, but these do not need to be set forth.

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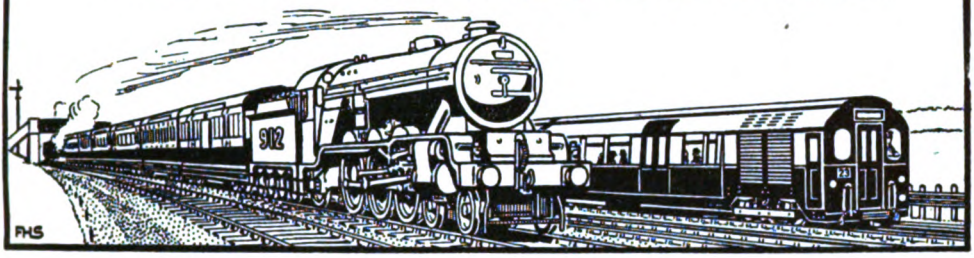
WHAT THE RAILWAYS ARE DOING.



NEW YEAR HONOURS.

Baronet.

MR. EDMUND RUSSBOROUGH TURTON, J.P., D.L., M.P., Chairman, Railway Clearing House.

Knight.

Mr. Frederick Austin Hadow, C.V.O., Member, Railway Board, Government of India.

C.I.E.

Mr. John Richard Donovan Glascott, Agent, Burma Railways, and Port Commissioner, Burma.

C.M.G.

Lieut.-Colonel Woodbine Parish, C.B.E., Director, Buenos Ayres Great Southern, Buenos Ayres Western, Central Uruguay of Monte Video and Great Western of Brazil Railway Companies.

* * *

THE following official announcement, dated January 3, was made by the London Midland & Scottish Railway :—

"Sir Josiah Stamp, who has been in attendance at Euston Station for the past few weeks, will to-morrow (Monday) take up his duties as President of the Executive of the London Midland & Scottish Railway."

It was further pointed out that this post is a new one in British railway organisation, and was established by the directors of the L.M.S.R. in view of the situation created by the amalgamation and the problems arising therefrom. The intimation is also given that the Right Hon. H. G. Burgess continues as General Manager, L.M.S.R., also that Sir Josiah Stamp has retired from the secretaryship of Nobel Industries Limited, but remains a director.

* * *

To the January number of the *L M S Railway Magazine* Sir Josiah Stamp contributes the following "message" to the officers and staff of the L.M.S. Railway :—

"A sense of strangeness might seem to be natural to anyone coming for the first time into the midst of this great organisation, but I have really hardly had time or occasion to get that feeling, for I have been met everywhere, in London and the provinces, by the most cordial evidences of friendliness and good feeling.

"I enter upon my task—which is to join you in maintaining and making more perfect a great public service—by bringing to it an enthusiasm and resolve which have already been reinforced to a marked degree by the splendid spirit which seems to me to animate all with whom I have come in contact."

MR. J. WILLIAMS,

Superintendent at Shrewsbury, London Midland & Scottish and Great Western Joint Railways, 1906–26.

* * *

MR. J. WILLIAMS, Superintendent, Shrewsbury, London Midland and Scottish and Great Western Joint Railways, who, as previously announced was to have retired on December 31, is continuing in office for the present as the working out of the details consequent on the revision of the arrangements for the working of the L.M.S. and G.W. Joint Lines is taking longer than was anticipated.

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Mr. Raymond Carpmael, who has been appointed Assistant Engineer, G.W.R., became, in February, 1924, Assistant to Joint Chief Engineers, G.W.R. He was educated privately between 1883 and 1890, and then at Dulwich College, where he spent two years on the science side and two years on the engineering side, during which time attention was also paid to chemical research work. Between 1894 and 1899 he served a pupilage with Stothert & Pitt Ltd., crane and harbour plant manufacturers, Bath, then spending 18 months on the commercial side of the business of that firm. In March, 1900, he entered Great Western Railway service in the bridge department at Paddington, and in 1901 was appointed an assistant on the Fishguard Harbour works under Mr. G. Lambert Gibson, M.Inst.C.E. In 1902 he was appointed Chief Assistant, in which position he was responsible for a great deal of the notable engineering work involved by the undertaking then in progress at Fishguard. During 1907 and 1908 Mr. Carpmael served as Resident Engineer under Mr. W. W. Grierson, in charge of new works at Weymouth and Carmarthen. Between 1909 and 1916 he served as Chief Assistant at Shrewsbury under Messrs. H. K. Woodward and R. C. Sikes. In 1916 he was transferred to Gloucester as Chief Assistant to Mr. G. W. Blackall. During 1917 he was Senior Engineer in charge of No. 3 (G.W.R.) Civilian Railway Company engaged in laying in and maintaining railways, siding yards, &c., in France and Flanders. In 1919 he was appointed Divisional Engineer at Shrewsbury, in 1922 being transferred to Neath in a similar capacity. Mr. Carpmael is a member of the Institutions of Civil and Mechanical Engineers and a Fellow of the Permanent Way Institution.

MR. R. CARPMAEL,

Assistant Engineer,
Paddington, Great Western Railway.

MR. E. G. MATHESON,

Assistant Engineer,
Paddington, Great Western Railway.

* * *

Mr. E. G. Matheson, A.M.Inst.C.E., who has been appointed Assistant Engineer, G.W.R., succeeded the late Mr. H. K. Woodward as Divisional Engineer, Bristol, in October, 1924. Mr. Matheson joined the New Works staff of the Great Western Railway in 1905, under Mr. W. Y. Armstrong, and for a time was employed at the head office in the preparation of plans and estimates for projected lines in South Wales, and afterwards assisted the Resident Engineer in the construction of the Ashendon & Aynho Railway, and the reconstruction of Snow Hill Station, Birmingham. Mr. Matheson volunteered for service in 1915, commanding a Railway Instruction Company in France, held the rank of Major, was twice mentioned in despatches, and awarded the O.B.E. (Military). Since demobilisation in 1919 he has been Resident Engineer on the construction of the St. Denis Branch, Deviation, the Kingswear Branch Deviation

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and the enlargement of Parson Tunnel, Dawlish, and then for two years Assistant Divisional Engineer, Bristol. Mr. Matheson is a brother of Mr. D. A Matheson, Deputy General Manager for Scotland, L.M.S.R.

* * *

As from January 1, the Publicity Department at Waterloo and the Advertising Department at London Bridge, Southern Railway have been amalgamated to form the Advertising Department, with headquarters at Waterloo Station. The new department ranks as a branch of the General Manager's Office, and is under the control of Mr. J. B. Elliot, as Assistant to the General Manager, with Mr. F. V. Milton as Assistant Advertising Manager, Mr. G. H. Dennis, formerly in charge of the Advertising Section, has retired.

* * *

Mr. J. B. Elliot, who has been appointed Assistant to the General Manager, Southern Railway in charge of publicity and advertising came to Waterloo, in January, last year in connection with publicity work, as a "public relationships" officer. His position was also intended to provide a link between the General Manager's Department of the Southern Railway and public and local associations and other bodies in the area served by the system. Mr. Elliot obtained his early training on the *Evening Standard*, gaining further experience on the *New York Times*, while more recently he has been associated with the editorial side of the *Daily Express*. His last appointment was as an Assistant Editor of the *Evening Standard*.

* * *

Mr. F. V. Milton, who has been appointed Assistant Advertising Manager, Southern Railway, has, since the reorganisation which followed grouping, held the position of Chief of the Publicity Section of the General Manager's Department. He entered the Traffic Department of the London and South Western Railway in 1888, and served at Clapham Junction and other London stations. In 1893 he was transferred to the Superintendent's Office, assisting to deal with damage to stock, through working of saloons, &c. In 1894 he passed to the Goods Manager's Office (canvassing and general), and thence to the personal staff of the Goods Manager (Sir Chas. Owens). In 1898 when Sir Chas. Owens was appointed General Manager, Mr. Milton was transferred to his office. In 1913 Sir Herbert Walker created a publicity Department, and Mr. Milton was placed in charge. The business done included general developments, ticket agencies, and sites for factories. A Conti-

Photo.] [*Swaine.*

MR. J. B. ELLIOT,

Assistant to General Manager,
Southern Railway,
in charge of Publicity and Advertising.

MR. F. V. MILTON,

Assistant Advertising Manager,
Southern Railway.

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MR. G. H. DENNIS,

Chief of Advertising Section,
General Manager's Department,
Southern Railway, 1923–25.

nental section was added in 1914. Mr. Milton was also appointed Editor of the *South Western Magazine* in 1918, a position which he still retains. Mr. Milton has served on several committees and is a British delegate to the International Union of Railways.

* * *

MR. G. H. DENNIS, who has retired from the position of Chief of Advertising Section, General Manager's Department, Southern Railway, commenced his railway career with the London, Brighton and South Coast Railway in May, 1883, as an assistant clerk. After six years of station experience he was transferred to the office of the late Mr. John Richardson, then Traffic Superintendent. Gaining experience in various departments at London Bridge, including several years in the time-table and special traffic sections, he was transferred in 1899 to the advertising department under the late Mr. J. F. S. Gooday, and later given control of the department under Sir William Forbes. Mr. Dennis took a leading part in the development of co-operative advertising and the formation of a municipal advertising committee for South Coast towns, and for many years was adviser to official publicity associations in the territory served by the late London, Brighton and South Coast Railway. On the formation of the Southern Railway, Mr. Dennis was given the position from which he has now retired. It is interesting to note that Mr. Dennis's family has been associated with the London, Brighton and South Coast Railway back to the 'forties.

* * *

MR. JAMES PAGE, who has retired from the position of station master at Paddington, G.W.R., to which he was appointed in July, 1920, when he succeeded Mr. Weaver, entered G.W.R. service in 1876 as a lad, clerk in the Telegraph Department at Slough. After working at various stations in the London division, he was transferred to the Divisional Superintendent's office at Paddington in 1880. Twelve months later he sought outdoor experience, and in 1888 was appointed station master at Princes Risborough. He was later attached to the divisional relief staff until his appointment to the position of station master at Slough in 1900. Four years later he was appointed Assistant station master at Paddington, and in 1913 station master at Taunton.

* * *

MR. JOHN GOVAN, who has been appointed Steamship and District Superintendent at Belfast, L.M.S.R., has, for several years past, held the position of District Traffic Agent in Belfast for the joint services. Mr. Govan, who is a native of Belfast, entered joint L. & Y. and L. & N.W. service in the department dealing with the Fleetwood steamers as a boy, and during succeeding years became

MR. J. PAGE,

Station master, Paddington,
Great Western Railway, 1920–26.

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closely associated with trade and traffic connected therewith. In 1916 he became Chief Clerk in the Fleetwood steamers office, thus leading the way to his appointment as District Traffic Agent in Belfast as above mentioned.

* * *

MR. W. F. MINNIS, Belfast and County Down Railway Company, has been unanimously re-elected Chairman of the Traffic Officers' Committee for the year 1926. Mr. Minnis became Traffic Superintendent of the Belfast and County Down Railway in 1904, prior to which he was Goods Agent in Belfast.

* * *

THE men of the Carriage and Wagon Department of the L.M.S.R., Derby, have presented and installed wireless equipment for the use of the eye wards of the Derbyshire Royal Infirmary. Mr. W. J. Smith (Superintendent of Works), who presided at the presentation on December 16, said he was proud to belong to a department which, he believed, subscribed the largest amount of money to that institution of any establishment in Derbyshire. Dr. Collier Green, on behalf of the Board of Management, thanked the donors.

* * *

THE name of Dame Emmie Needham Fowler, wife of Sir Henry Fowler, K.B.E., LL.D., Chief Mechanical Engineer, L.M.S.R., has been added to the magisterial roll for the County Borough of Derby. Lady Fowler has identified herself closely with social and philanthropic work in the town, and has proved a very useful member of the Derby Board of Guardians, to which body she was elected unopposed in October, 1923.

* * *

MR. R. M'INTOSH, who has been appointed Locomotive Running Superintendent, Great Northern Railway of Ireland, in place of Mr. A. W. Denniss, who has retired owing to ill-health, was District Locomotive Superintendent at Adelaide Running Shed for about ten years and was transferred from Belfast to Dundalk as Works Manager in January, 1919.

* * *

THE following notice appeared in *The London Gazette* for December 11 :—Engineer and Railway Staff Corps.—R. W. Reid, C.B.E., M.I.Mech.E., to be Maj. (Nov. 20).

* * *

SIR VINCENT RAVEN has gone to India to act as Chairman of the Committee of Technical Experts to report on the question of the capacity of the Indian State Railway Workshops, and the possibility of reorganisation and improvement on co-ordinated lines.

* * *

THE University of Edinburgh has conferred the degree of Doctor of Philosophy upon Councillor John Taylor, M.A., Chief of the Timetable and Special Traffic Sections of the Superintendent's Office, Southern Scottish Area, L.N.E.R., Edinburgh, for the writing of a thesis on "Railway Organisation and Administration." Such a distinction is believed to be unique in railway circles, inasmuch as it is the first time that a Doctorate has been conferred on a member of the British railway staff as a result of a candidate's own research work. Dr. Taylor joined the service of the old North British Railway some twenty years ago. Dr. Taylor is a Councillor of the Royal and Ancient Burgh of Dalkeith, in Midlothian.

* * *

MR. GEO. T. HEDGE, O.B.E., M.Inst.T., Outdoor Commercial Manager, Southern Railway, who is a member of the Citizen and Carmen's Company, has been elected by the Livery to the Court of Assistants.

* * *

THE death on Christmas Day, in her 92nd year, is announced of Charlotte Jemima Findlay, widow of Sir George Findlay, who was General Manager of the London and North Western Railway 1880–93, and was author of the well-known book, "The Working and Management of an English Railway," which went through several editions.

* * *

WE regret to record the death of Sir George Stegmann Gibb, formerly General Manager of the North Eastern Railway and later Chairman of the Metropolitan District Railway Company and certain other lines associated therewith.

* * *

AT Liverpool Street Station, on Thursday, December 31, a presentation was made to Mr. F. H. London, O.B.E., Assistant to the Divisional General Manager of the Southern Area, London & North Eastern Railway, on his retirement after a period of over 40 years' railway service. The ceremony was presided over by Mr. Oliver Bury, a director of the London & North Eastern Railway, who was supported by a number of officers of the L.N.E. Company, particularly those formerly connected with the Great

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Northern Railway. The following Southern Area officers, Messrs. C. J. Brown (Engineer), A. J. Brickwell (Estate and Rating Surveyor), G. Marshall (Goods Manager), C. J. Selway (Passenger Manager), T. Smith (Assistant Superintendent) also referred to the very cordial relationship which always existed between the departmental officers and Mr. London in Great Northern days, and associated themselves with the good wishes expressed by the chairman.

* * *

MR. DONALD MATHESON, Deputy General Manager for Scotland, L.M.S.R., writing recently to Inverness Town Council, stated that through the kind offices of Mr. Albert E. Pullar, the directors had agreed to present to the Council a portrait of the late Sir Alexander Matheson, Bart., and a portrait of the late Hon. Thomas Charles Bruce, to be hung in the Town Hall. The directors had pleasure also in presenting the two ornamental carved mahogany barrows, each with a spade of silverised steel, which were used on the occasion of cermonial cuttings in connection with the construction of parts of the Highland Railway, to be housed in the local Museum.

* * *

IT is anticipated that when the "Underground" extension to Morden is opened, about midsummer, there will be 420 trains each way daily as far as Tooting, and 257 through to Morden. There will then be upwards of 5,500 trains daily serving the various terminals of the Hampstead and City lines, together with their extensions. About 300 additional men will be required as staff when the extension is opened, and these are now in course of training.

* * *

THE Belfast and County Down Railway is introducing third-class monthly season tickets. The arrangement is for the time being of an experimental character, for a period of four months.

* * *

ASSOCIATED with the linking up of No. 11 platform in Victoria Station and No. 3 in Exchange station, Manchester, giving a combined length of 2,200 ft., the longest platform in the world, is the construction of a new entrance, with an additional booking office, opposite the Hunt's Bank offices. New rail connections and power signalling are also to be installed.

* * *

THE company formed to construct the Cromarty and Dingwall Light Railway is now in course of winding-up. The scheme has been under consideration for many years, eventually taking shape as one for a line between Cromarty and Conon, utilising the existing Highland line to obtain access to Dingwall. Work was actually commenced at the Cromarty end, but came to an end in 1914 when the Government commandeered the interests to meet war requirements.

* * *

A JOINT committee has been formed by the traffic and operating officials of the Canadian National and Canadian Pacific Systems "for the purpose of dealing in a broad way with all questions affecting competitive service and of making time-table changes which will be consistent with efficiency and economy." Reuter reports that Sir Henry Thornton and Mr. E. W. Beatty individually confirm the formation of this committe which is stated to have been in existence for some time and to have already held several meetings.

* * *

SOME time ago, through the *Southern Railway Magazine*, members of the staff were invited to send in suggestions for an appropriate name for the 11 a.m. West of England express from Waterloo. A prize of three guineas has been awarded to Guard F. Rowland, attached to Waterloo Station, who was the first of four competitors who suggested the title "Atlantic Coast Express." The three other competitors who suggested the same name, but under a later date, have been presented with "King Arthur" paperweights.

* * *

A VERY successful exhibition was held by the Wimbledon and District Model Railway Club on Monday, December 21, at the Welcome Hall, High Street, Wimbledon. A good show of members' work was on exhibition, including some exceptionally well-executed small-scale track exhibits, as well as locomotive models. The new test track was brought into use, though, unfortunately, a slight mishap to the engine which was intended to convey passengers thereon placed it out of action, this being, however, the only disappointing feature of the proceedings. The cup and prizes were distributed by the President, Sir Joseph Hood. These were allocated on the basis of a ballot by which the members themselves were constituted the judges. Mr. Percival Marshall, Editor of *The Model Engineer*, and Mr. J. F. Gairns, Editor of THE RAILWAY MAGAZINE, acted as scrutineers. Both of these gentlemen gave short speeches following that of the President.

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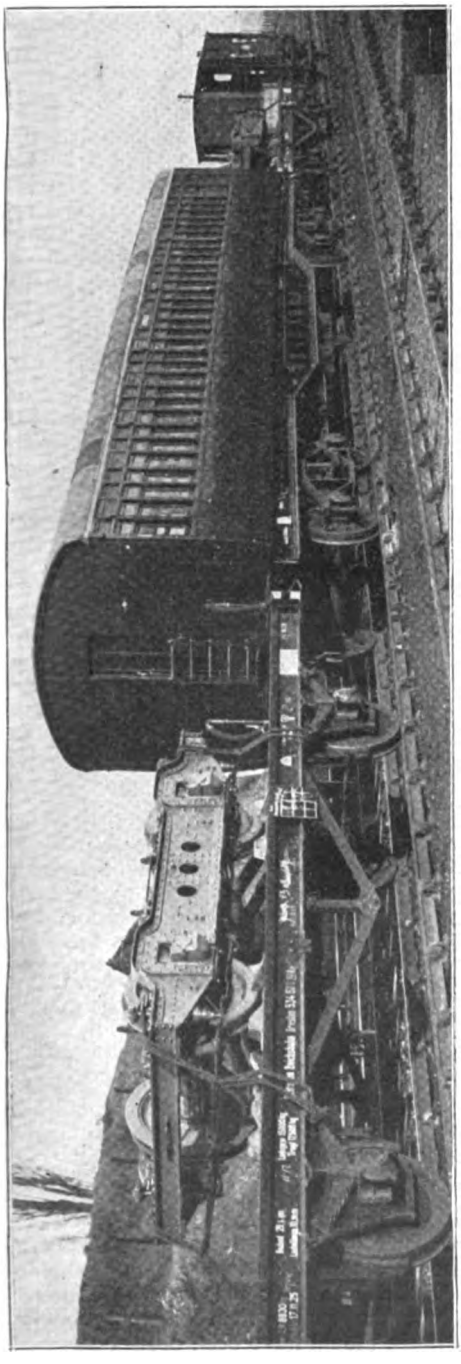
An interesting view is reproduced, showing a German-built coach, intended for service in South Africa, which was brought over by the Harwich-Zeebrugge train ferry and then conveyed by rail to Preston to receive internal fittings. The carriage was forwarded from the Linke-Hofman-Lauchhammer Aktiengesellschaft, Breslau, to the English Electric Company's siding at Preston. The transport negotiations were made by Dederich Limited, railway contractors, of Stanley House, Dean Stanley Street, Westminster, S.W. 1, the agents of the senders. The coach is ultimately for the South African Railways, for one of the local lines in Cape Town, and to effect transit to England was fitted with temporary bogies, the narrow bogies being loaded on the guard trucks.



GERMAN ROLLING-STOCK FOR SOUTH AFRICA FORWARDED TO ENGLAND BY TRAIN FERRY. [Topical.

* * *

Weekly season tickets are now issued between Fenchurch Street and Mark Lane, and Bromley, West Ham, Plaistow, Upton Park, East Ham, Barking and Dagenham, L.M.S. and Metropolitan District Railways.

* * *

Reconstruction works have been commenced at Wimbledon S.R., estimated to cost about £250,000.

* * *

The training school of the L.G.O.C. has been transferred from Milman's Street, Chelsea, to new and more commodious quarters at Chiswick.

* * *

In commemoration of the 100th anniversary of the birth of Dom Pedro II, the Brazilian Government has changed the name of the Central Brazilian Railway, naming it after the former Emperor.

* * *

At the annual general meeting of the Great Eastern Amateur Athletic Association, Mr. S. W. Frost, Hon. General Secretary, reported another successful year. The number of clubs now affiliated to this Association, which is the only Association of its kind on the L.N.E. Railway, is 86, and this takes in all classes of sport. All the clubs are thriving, and in only one case during the past year has it been found necessary to give financial assistance. The following are the officers elected for the forthcoming season :—

Chairman, Mr. John Miller ; Hon. General Secretary, Mr. Stan. W. Frost ; Hon. Assistant General Secretary, Mr. J. E. Smith ; Hon. Financial Secretary, Mr. H. E. Snelling ; Hon. Press Secretary, Mr. W. A. H. Burrus ; Hon. Treasurer, M. G. J. Hyde.

* * *

The Aire & Calder Navigation has presented to the L.N.E.R. Museum at York some early rails and chairs from the Silkstone Railway. This line, built in 1909, connected the Silkstone Colliery with the Barnsley Canal.

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THE L.N.E.R. is to erect a new brick and concrete goods shed at King's Lynn for the convenience of traders, at a cost of £10,000, and new offices to accommodate the whole of the company's dock and harbour clerical staff, at a cost of £4,000.

* * *

THE L.N.E.R. announce that the special town-to-coast half-day excursions which were introduced as an innovation in July last from various towns throughout their system to coast resorts have been an enormous success. Altogether 563 trains carried 250,000 passengers to the seaside by this method alone, and 102,500 additional train-miles were run. The excursions have proved so popular that the L.N.E.R. have under consideration the running of still more trains of this character this year.

* * *

THE L.N.E.R. are gradually discarding the hanging buffers fitted to their mineral wagons in the North-Eastern Area. The only difficulty the company have to face in dispensing altogether with the hanging buffers is that of keeping in position the haulage cable while mineral wagons are traversing certain curves on the Tanfield branch. To meet this difficulty the company will require to spend several thousand pounds in straightening the curves on these inclines, unless some cheaper alternative can be produced. The company are prepared to offer as a reward £100 for any satisfactory alternative invention put forward and adopted which will have the effect of saving the outlay on the alteration of the permanent way. Suggestions, with full particulars, should be forwarded to the Divisional General Manager, North-Eastern Area, L.N.E. Railway, York.

* * *

DISTANT signals on the L.N.E.R. are now being painted yellow and fitted with yellow spectacles in place of red, displacing illuminating fish tail distant signal lamps where they were in use. The same practice is being followed on the C.L.C. lines, and on other joint lines where the signalling is maintained by the L.N.E.R.

* * *

THE old Stephenson locomotive, which was shown at the British Empire Exhibition, has been replaced upon its pedestal at Newcastle (Central station.)

* * *

A DRAFT order has been submitted to the Ministry of Transport by Colonel H. F. Stephens for the construction of a light railway between Killay and Port Eynon, *via* Llanrhidion, on the Gower Peninsula, South Wales.

* * *

"ADVICE to Schoolboys and Others—Admire our Pictures, don't Deface them." This is the phraseology of a printed notice which the Great Western Railway are affixing to their pictorial posters. A trial indicates that its effect has been even more marked than the threat of prosecution.

* * *

THE Minister of Transport has recently made the undermentioned Order:—The Ministry of Transport (Metropolitan District Railway) (No. 2) Order, 1925, authorising the acquisition by agreement of certain lands in the City and Metropolitan Borough of Westminster and the construction of works by the Metropolitan District Railway Company and matters incidental thereto.

* * *

INDIA has become a regular purchaser of creosoted railway sleepers from British Columbia. Douglas fir, when treated with creosote, has shown itself capable of resisting the attacks of white ants. A shipment of 2,500,000 ft. of creosoted Douglas fir trees was recently made from Vancouver to India.

* * *

"As an acknowledgement of the admirable manner in which the transport services were conducted during the Holy Year." the Administrative Committee for the Holy Year Ceremonies in Rome have given 80,000 lire to various railway charities and 20,000 lire to organisations connected with the Rome tramway workers.

* * *

PASSENGERS to and from the Continent by the Folkestone route of the Southern Railway will shortly be able to embark and disembark under more comfortable conditions. At present passengers have to cross the width of the pier between the platform and the steamer in the open, extremely unpleasant in wet and windy weather. The Southern Railway is now erecting a substantial roof over the portion of the pier used by Continental passengers, which will afford them complete protection from the weather when passing from train to steamer and *vice versa*.

* * *

MR. C. HAMILTON ELLIS points out that in the mention in "Locomotive Matters" of the fact that Southern Railway engine No. 0422E was involved in the Lydford accident, the engine number was wrongly stated. It should have been 0442E.

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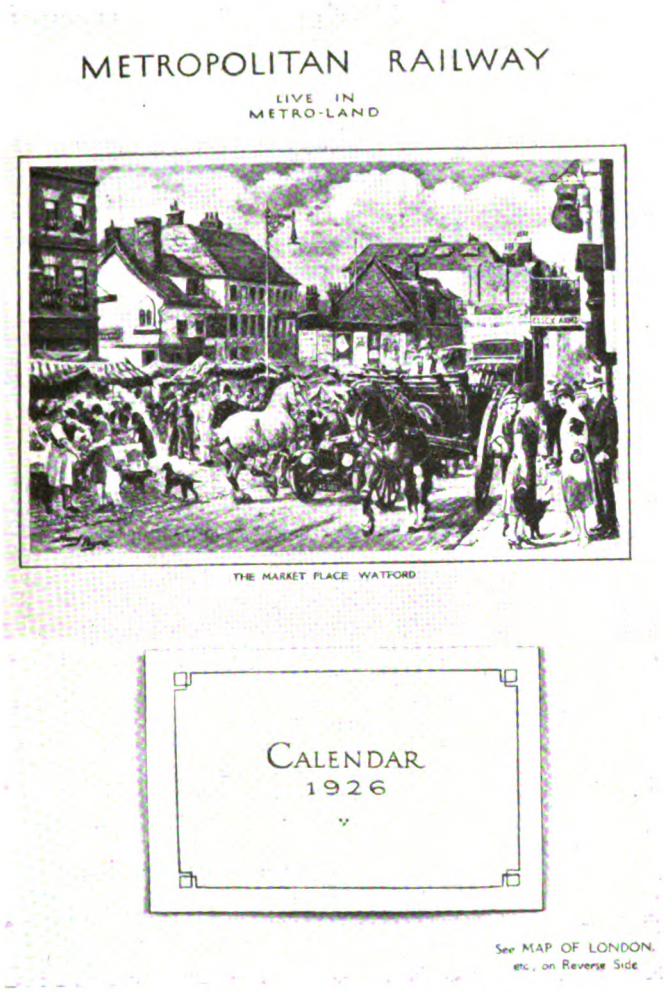

METROPOLITAN RAILWAY CALENDAR, 1926.

Copies can be had from Mr. J. Wardle, Commercial Manager, Baker Street Station, on receipt of 3d. to cover postage.

AN extremely enjoyable Bohemian Concert was given by the L.N.E.R. Musical Society in the Hamilton Hall, Liverpool Street Station Hotel, on January 13, under the chairmanship of Mrs. James McLaren, wife of the Secretary of the company. The orchestral items, under Colonel William Johnson Galloway, were highly appreciated, sharing in the demand for encores, a very popular item being a lengthy selection of Scottish melodies which concluded the programme. The soloists were Miss Mary Hamlin and Miss Anne Liddell. Mr. Alex. Wilson proposed, in humorous vein, a vote of thanks to Mrs. McLaren for occupying the chair, to which Mr. McLaren replied on behalf of his wife.

WE are officially informed that the L.N.E.R. is re-organising the work of the Locomotive Running Department in the North Eastern Area. Mr. J. H. Smeddle, the present Locomotive Running Superintendent, remains in charge with Headquarters at York, where he will be now supported by two Assistant Locomotive Running Superintendents, Mr. C. M. Stedman and Mr. H. J. Stephenson. Mr. Stedman, after holding several important posts with the old Great Eastern Railway, became Assistant Locomotive Running Superintendent for the Southern Area in 1923. Mr. H. J. Stephenson has been the Assistant in charge of the northern part of the North Eastern Area since 1922; his existing office at Gateshead is being closed.

* * *

THE third annual dinner of the L.N.E.R. Advertising Department took place on Saturday, January 9, at the Holborn Restaurant, Mr. W. M. Teasdale, Advertising Manager, presiding over a large gathering. As chairman he insisted on "no speeches" as the order of the evening, but this did not prevent the exchange of very cordial sentiments between himself and those present during an informal entertainment which afterwards took place.

* * *

MR. J. A. PARKER, formerly Engineer of the Great North of Scotland Railway, who has, since amalgamation, acted as Engineer for the Northern Scottish Area of the London and North Eastern Railway, retired on January 31. Mr. W. A. Fraser, Engineer for the Southern Scottish Area, whose Headquarters are located at Edinburgh, has been appointed Engineer for Scotland, responsible for the engineering work on the Great North of Scotland Section, which is placed in charge of a District Engineer at Aberdeen. The directors have appointed to the latter position Mr. R. Peters, an Assistant in the District Engineer's office at Darlington.

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Under this heading will be inserted short references to news items relating to locomotive engines and their duties. It must be understood, however, that information as to the stations of particular engines cannot be given, for the reason that, before the date of publication, transfers may have taken place, while lists of engines, &c., debarred from "The Why and the Wherefore" section, cannot be included under this heading. With this understanding, notes as to matters thought to be of general interest will be welcomed.

L.M.S.R.

An old L.N.W. 2-4-0 type locomotive, No. 817 *Constance*, which has been employed on shunting duties at Exchange Station, Manchester, during the past twelve months, bears on the name-plate the date "January, 1866." Thus, this engine will shortly attain her sixtieth birthday.—[S. IRLAM.]

No. 1184, the last of the batch of 25 4-4-0 compounds built for service on the L.N.W. section by the Vulcan Foundry, is now at work. Four others of the same type have also arrived from the Horwich works, Nos. 1121–4. A further ten engines of the 0-6-0 superheater goods type have been put on order at Crewe, making 80 in all. The latest out is No. 4144. Two further 0-8-0 class B compounds have been simplified and superheated, viz., Nos. 1039 and 1249, both of which are now classed G1. Engines rebuilt with Belpaire boilers and "Pop" safety valves include "Prince of Wales" class Nos. 252, 296, 331, and 357, and "18-in." class goods Nos. 725, 1146, 1798 and 2315. Recent scrappings at Crewe include the following:—"Experiment" class No. 1986 *Clanricarde*, "6 ft. 6 in." S.L. class No. 2193 *Salopian*, "Renown" class No. 1947 *Zillah* formerly *Australia*, N.L.R. "1 to 10" class Nos. 2848 and 6462, and "4 ft. 6 in." passenger tank Nos. 383, 529, 791, and 1441. Ex Knott End 0-6-0T No. 410 *New Century* of the G1 class has been fitted with new cylinders and piston valves.—[F. INGHAM.]

Midland type 4-4-0 3-cylinder compound engines stationed at Rugby (8) sheds include Nos. 1115–8, 1152–4, 1156, 1173, and 1176; at Bushbury (18) sheds, Nos. 1119, 1162–3, 1166, and 1169; at Camden (1) sheds, Nos. 1150, and 1157–61. Other engines noted on the L.N.W. section are Nos. 1110, 1113, 1118, and 1127. The Bushbury and Camden engines usually work on the Birmingham two-hour expresses. Midland type 4-4-0's Nos. 4058, 4066, 4073, 4082–3, 4111–2, 4116–7, 4121, 4124, 4030, 4032, 4036–7, and 4039 work into the Birmingham district from Aston (10), and Bescot (6) sheds.—[H. W. HEATH AND R. DYSON.]

Midland type 0-6-0's Nos. 4071 and 4074 have been noted at Oxford, L.M.S.R. [G.W.]

Midland type 0-6-4T Nos. 2004, 2010, and 2022 have been noted at Trafford Park. 2-4-0's Nos. 354, and 356 have been working L. and Y. section trains. 4-6-4T's Nos. 11111, 11115, and 11118 are still painted black.—[R. DYSON.]

Ten 0-4-4T locomotives of Caledonian design have been completed by Nasmyth Wilson and Company and are in service on the Cathcart (Glasgow) suburban services. They bear the running Nos. 15260–15269 inclusive. St. Rollox built 0-6-0's Nos. 4203–4206 are on the Midland section.—[F. INGHAM and J. A. TRON.]

New 4-4-0 compounds Nos. 1125–7 ex Horwich Works and No. 1110 ex Derby Works are now in service on this section. The last of the Kerr Stuart goods No. 4106, is also in service. Further new ones completed at Crewe are Nos. 4157–9. These and upwards to No. 4176 are for service on the Midland Division. No. 1161, *Sir Robert Turnbull* ("Claughton" class) is now running with the L.M.S. No. 5901 in small yellow figures on the cab sides, but still retains the old L. & N.W. livery. No. 1888 ("G 1" class) has been turned out painted goods black and renumbered 9600. *Engineer Bangor* the last remaining of the old 6 ft. 2-4-0 curved link, or "Samson," class, has been withdrawn for scrapping. The following 0-6-2 side tank coal engines have been fitted for working motor trains:—Nos. 582, 771, 928 and 7794.—[C. WILLIAMS.]

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L.N.E.R.

Further "Pacific" type locomotives to receive names are the following:—Nos. 2556 *Ormonde*, 2573 *Harvester*, 2578 *Bayardo*, 2580 *Shotover*, 2581 *Neil Gow*, and 2582 *Sir Hugo*. Director class locomotive No. 6387 running on the N.B. section has been named *Lucy Ashton*.—[E. HAIG and F. INGHAM.]

The numbers of the new 0-6-0 locomotives of class "J38" now under construction at Darlington for service in Scotland are as follows:—1400, 1401; 1403–1411, 1413–1417, 1419–1424, 1426–1428, 1434, 1437, and 1440–1447.—[E. HAIG.]

A series of 0-6-0 shunting locomotives of class "J72" is being completed at Doncaster works, and bears the Nos. 500, 512, 516, 524, 542, 556, 571, 574, 576 and 581.—[F. INGHAM.]

Eight Darlington-built 2-6-0's are stationed at Gorton, including Nos. 208, 229 and 231. G.N. 4-4-2 type locomotives are doing an increasing amount of work on the Cheshire Lines, among those noted are Nos. 3272, 3285, 3290 and 4402. The two remaining "single-drivers" of the old Great Central, Nos. 5969 and 5972, are still running on Manchester-Liverpool ¾-hour expresses, but are expected to be scrapped when their boilers require replacement.—[DAGMAR AND R. DYSON.]

A N.E. 2-4-0 locomotive, No. 1463, recently worked a train from Wetherby to Leeds. This class is seldom seen in the area. A N.E. 4-4-0 No. 1238 is often seen in the G.N. station at Leeds, as are also many G.C. tank locomotives. G.C. 4-6-2T No. 1719 works regularly between Micklefield and Leeds. Great Central type 2-6-4T No. 5272 is at Grimsby engaged on heavy marshalling work. Many of the Pollitt 4-4-0's and 0-6-0's have been fitted with the new type of chimney. Of the old Sacré outside frame engines mentioned in the December issue, several of these engines of the 4-4-0 and 2-4-0 types until recently worked passenger trains between Cleethorpes and New Holland, and some are still engaged on ballast and similar work in North Lincolnshire. The 0-6-0 outside frame engines are of two distinct classes, viz.:—Nos. 5549–5560, which are practically all stationed at Staveley depot, and the smaller type, of which Nos. 490B, 6425, 6427, 6435–6, 5491, and 5494 have been recently noted, and most of which are stationed in the South Yorkshire area. No. 6466, a 4-4-0 with outside frames is used on workmen's trains between Annesley loco. and Bulwell, and this fact will account for its having been seen at Annesley sidings. Robinson 4-4-0's Nos. 5103, 5104, 5105, 5106 and 5109 are now at Immingham. Darlington-built 2-6-0's Nos. 80, 82, 109, 112, 120 and 124 have been working on the Grimsby-London fish trains. Old G.N. 2-4-0 locomotive No. 814 has just received her new No. 3814 and is stationed at Louth. A large number of this type were at Louth for many years but are now replaced by 4-4-2T's and 4-4-0's. 4-4-2T's Nos. 3503, 3506, 3509, 3514 and 3525, and 4-4-0's Nos. 4304, 4307, 4314 and 1376 are stationed at Louth. The bulk of the goods and mineral traffic between Grimsby, Boston, Spalding, Peterborough, and March is handled by G.N. 0-6-0's, G.E. 0-6-0's, and G.C. 2-8-0's and 0-6-0's.—[J. D. ROBINSON and E. H. CATO.]

On a recent occasion N.E. 4-4-2 No. 699, working the York-Harwich train into Lincoln, failed, and G.E. 4-4-0 No. 8824, which was working the return train Harwich to York from March to Lincoln worked on to York.—[G. EVERETT.]

An outside cylinder 0-8-0, of G.C. design No. 6073 was observed at Hatfield recently.—[M. C. PITTS.]

Several of the new "N.7" class 0-6-2T's are located at Neasden, and a fair number are now at King's Cross. Nos. 947, 949, 950, 964 and 966 have been sent to Stratford. Since their arrival on the G.E. section several engines of the "1000" class have been put in service on the Enfield Town line. All the 990E type have been returned to the G.E. section except Nos. 991 and 992, which are still at Neasden.—[F. E. WILSON and G. WHITEHOUSE.]

G.W.R.

4-4-0's Nos. 3712 *City of Bristol*, 3713 *City of Chester*, 4171 *Armstrong*, and 4139 *Auckland* have worked Chester–Manchester trains recently, the latter engine with the name on the cab side encircling the number.—[R. DYSON.]

S.R.

There are still a few "Beattie" goods engines of class "J" scattered about the system. Other "Ancient and Honourable" machines recently noted in service include No. 162, (L.S.W. section) one of the original 5-ft. 7-in. Adams 4-4-0's fitted with solid bogie wheels and built in 1879. Also No. 446 A, 7-ft. 1 in, 4-4-0, built by Robert Stephenson & Co., 1883. This engine was in the late '80's experimentally rebuilt as a two-cylinder compound. Not proving a success it was altered back to its original condition. When I last saw her she was fitted

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with a "Drummond" type boiler, and was attached to a milk train at Waterloo.

[C. HAMILTON ELLIS.]

There are two standard 0-4-0 side-tank types used for dock service by the S.R.:—The "Cherbourg" class are of Mr. W. Adams' design. They have closed domes on the first ring of the boiler, and Ramsbottom valves over the firebox. Most of them are fitted with cabs, but some, like *Jersey*, have awnings only. The second class are of the improved "Drummond" pattern. They differ from the "Cherbourg" class in that the domes are set much farther back on the boiler barrel, and are surmounted by brass lock-up safety valves.

The latest L.S.W. section locomotives to be fitted with superheaters are 4-4-0's Nos. 113 and 283, and 0-6-0 No. 325. These engines, together with Nos. 119, 303, 427 and 428, have snifting valves. 4-6-0's Nos. 448 and 449 are shedded at Exmouth Junction, 450, 451 and 452 at Nine Elms, and 453–7 at Sarum. No. 451 was recently tried on the 11 a.m. ex Waterloo with a train composed of 15 bogie coaches.—["TINTAGEL."]

We are advised that the statement that S.R. 4-6-0 locomotive No. 454E *Queen Guinevere* has been fitted with a water scoop is not correct, and that it is not intended to make any trials with these engines on another line.—[ED. R.M.]

New 4-6-0 "King Arthur" class engines with six-wheeled tenders for the Brighton section will bear numbers 793 to 806. New 4-6-0 goods engines of the "496" class building at Eastleigh will be numbered 823 to 832.—[F. INGHAM.]

L.B.S.C. section 4-4-0 locomotive No. 49 has been noted running in the old colours but carrying her number on the side of the tender in the new style.—[S. D. CARNWATH.]

Wainwright 0-6-0 No. 721A, fitted with the Westinghouse brake, has been working regularly on "B" section on passenger trains between Tunbridge Wells and London. The 0-6-2T's Nos. 404B and 593B, formerly working on the S.E. & C. section, have been withdrawn from these duties and replaced by S.E. & C. 0-6-4T's.—[O. W. POTTER.]

Among the locomotives of the L.B. & S.C. section which have lost their names are Nos. 327 *Charles C. Macrae*, 319 *Leconfield*, and 52 *Sussex*.—[J. M. F. LIGHTLY.]

Irish Railways.

GREAT SOUTHERN.

There are at present only two G.S. & W. 0-4-4T's working on the D. & S.E. section, these are Nos. 47 and 75. Mixed-traffic 4-6-0 locomotive No. 501 of the "500" class is nearly ready for service, in Inchicore shops. G.S. & W. 0-6-0 engines Nos. 183 and 223 have on a few occasions worked on the English boat train to Dun Laoghaire (Kingstown). They are presumably the first six-coupled tender engines to negotiate the sharp curve down to the pier. The M.G.W. 0-6-0T's, formerly working on this section, however, often took the evening boat trains. The full list of the new numbers for the engines of the D. & S.E. section, Great Southern Railway, is as follows:—

New No.	Old No.	Type.
422	24	2-4-0
423	49	2-4-0T
424	9	
425	47	
426	7	2-4-2T
427	64	
428	3	
429	10	
430	11	
431	28	
432	45	
433	46	
434	8	
435	12	
436	27	
437	29	
438	30	
439	40	
440	17	
441	36	
442	13	
443	14	
444	18	0-6-0
445	65	
446	66	
447	50	
448	4	
449	5	
450	55	
451	56	
452	57	4-4-0
453	58	
454	67	
455	20	
456	34	
457	35	4-4-2T
458	52	
459	54	
460	53	
461	15	2-6-0
462	16	

Of the above engines, Nos. 422, 424, 425, 427, 433-5, 439-43, 448, and 449 are out on traffic. All the other D.S. & E. engines are scrapped, except No. 69 2-4-0 motor tank engine, which has been named *Elf* but is without a number. All the engines are to be fitted with G.S. & W. pattern chimneys, and No. 449 has a Belpaire boiler.—[K. A. MURRAY.]

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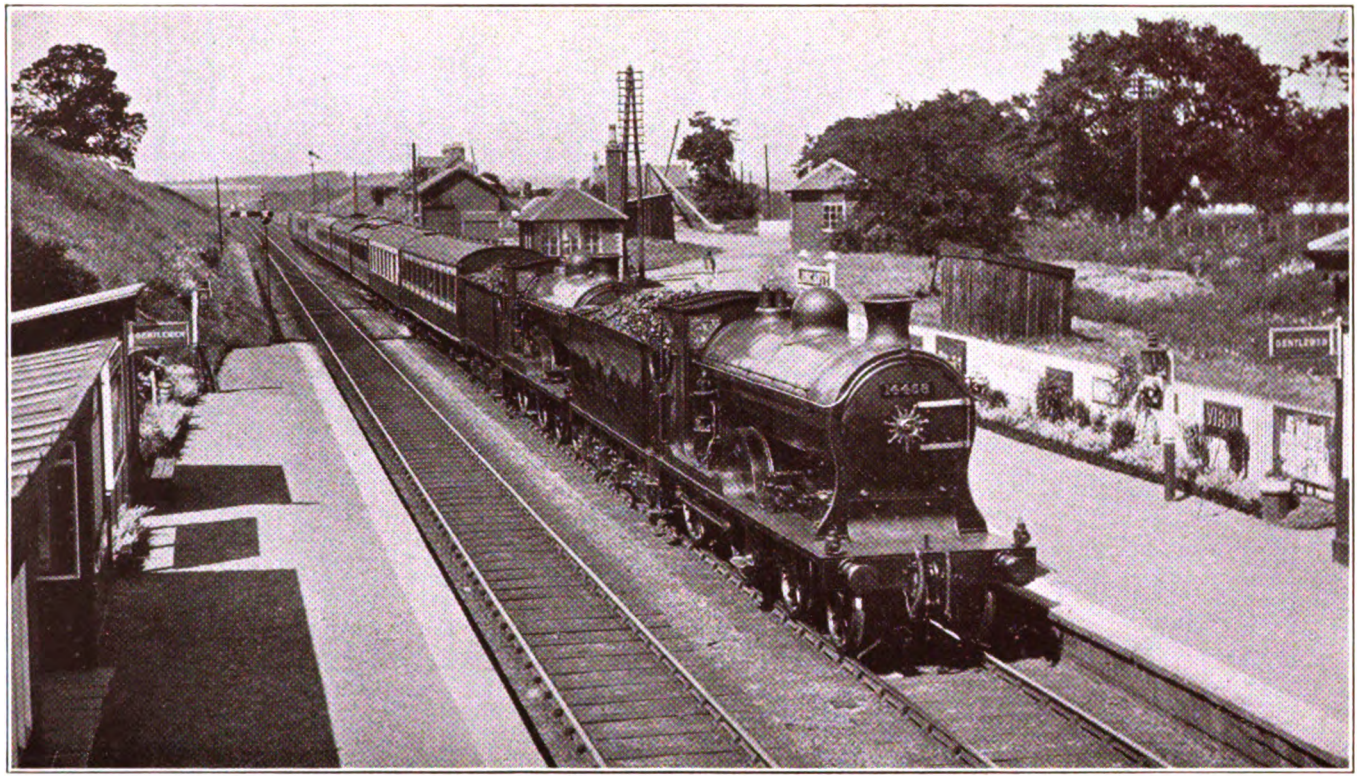

THE RAILWAY MAGAZINE.]

ABERDEEN-GLASGOW PULLMAN CAR EXPRESS, L.M.S.R., AT LUNCARTY.

Caledonian 4-4-0 Locomotives, Nos. 14458 and 14505.

(From a Photograph by H. Gordon Tidey.)

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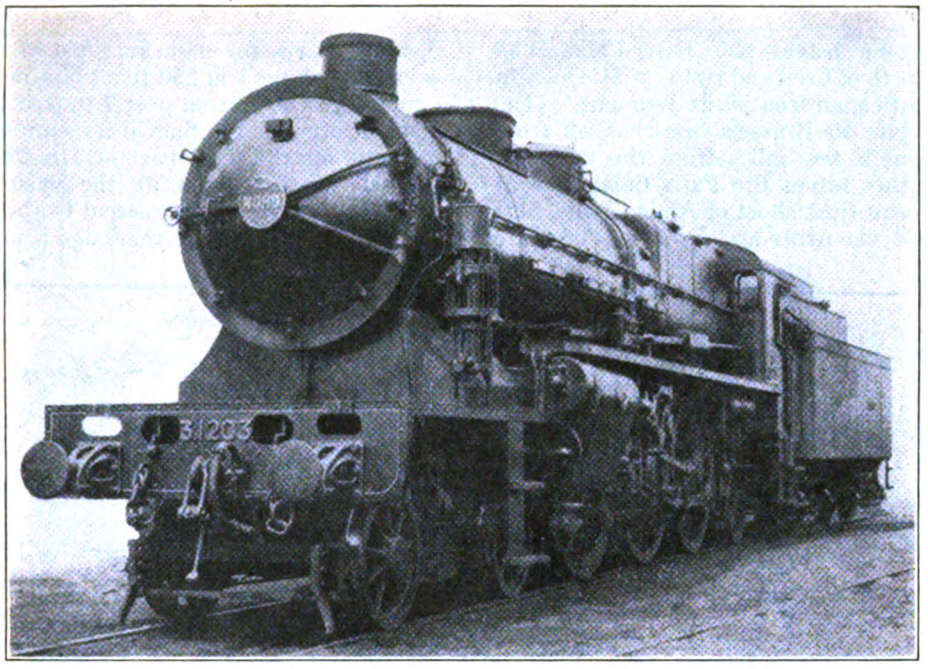

NEW 4-6-2 LOCOMOTIVE No. 3.1203.

The Northern Railway of France.

[No. I.]

By LORD MONKSWELL.

FOR the greater part of my life I have had the good fortune to enjoy frequent opportunities of acquainting myself with various aspects of the Chemin de fer du Nord, particularly with the work of the locomotives. Within the limits of an article it is, of course, impossible to give anything like a complete description of this railway, so I will begin with a few general notes and then pass on to the locomotives.

At the present time the Chemin de fer du Nord possesses about 2,400 miles of railway in France and some lines in Belgium. The Nord, as is the case with all the big French companies, has its district almost entirely to itself. The district served by the Nord is a particularly compact one, and it is possible to travel from end to end of the system in any direction without traversing a distance of so much as 200 miles. Owing to the inclusion in the system of numerous collieries, industrial districts and important international routes, the density of the traffic and the receipts per mile are much greater than those of any other big French railway.

The first line to be built of all those which now form the Chemin de fer du Nord was that between Villers–Cotterets and Port-aux-Perches, a concession for the construction of which was in 1836 granted by Royal Decree to a M. Charpentier.

The Chemin de fer du Nord itself was founded by Royal Decree in 1845, and by 1851 included all the more important of the existing Nord main lines except the direct line between Paris and Creil, the line between Boulogne and Calais, the main lines north-east of St. Quentin, and the line between Hazebrouck and Arras.

The principal main lines at the present time are those between Paris and Calais and two others branching off from this

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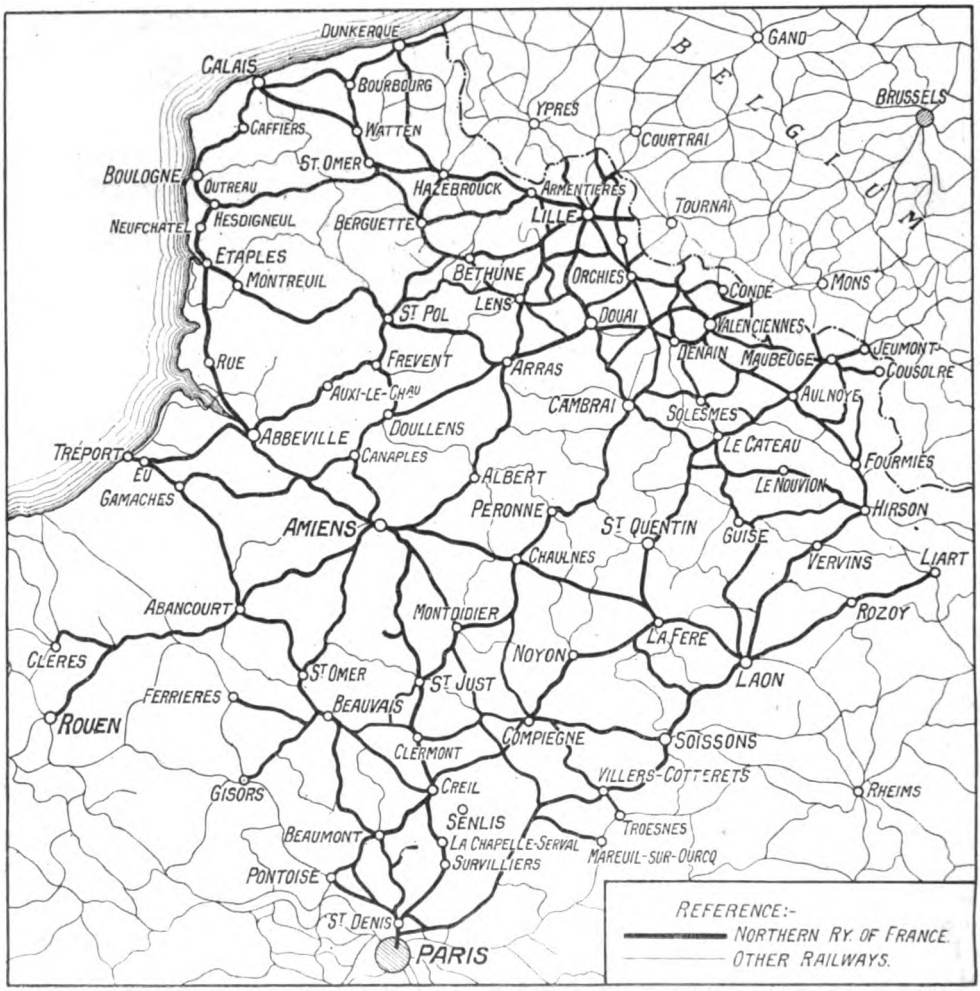
line. One leaves the Paris–Calais line just north of Creil and runs via St. Quentin to the Belgian frontier at Jeumont. (The main line to Brussels branches off from this line a few miles from the frontier.) The other leaves the Paris–Calais line at Longueau (just short of Amiens) and runs to Lille via Arras and Douai. These are the lines upon which all the best locomotive work is performed. Other important sections of main line are those between Calais and Lille, from Dunkirk to the Paris–Lille line at Arras, and from Longueau to Laon; this last forms part of the Calais–Bâle route to Switzerland.

The gradients of the main lines are, for the most part, moderately hard.

Leaving Paris, the main line first of all descends at about 1 in 250 to a point near kilometre-post 5. From post 7 to post 27 (where is situated the Survilliers summit) it ascends for the most part at 1 in 200, but little bits of level at the various stations reduce the average ascent to about 1 in 230. Some twenty years ago a new double line for express trains was built beside the original line about as far as kilometre 31. This line is slightly longer than the original line, and for down trains the gradients are different in the neighbourhood of Survilliers, where there is a flying junction. Thence the line falls to post 48 mostly at 1 in 200—little bits of easier gradient this time reducing the



MAP SHOWING PRINCIPAL LINES, C. DE FER DU NORD.

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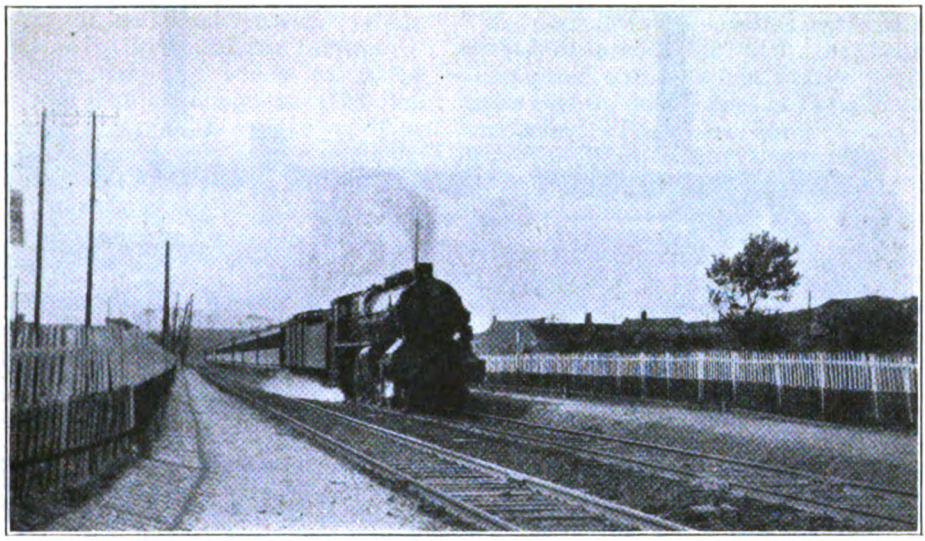

Photo.] **DOWN BOAT EXPRESS ON CAFFIERS BANK.** [*C. E. W. Neat.*

New 4-6-2 No. 3.1212.

average to about 1 in 220. At post 51, just beyond Creil station, another ascent begins; this, except for a slight descent between kilometres 63 and 66 and a little bit of level between kilometres 79 and 80, continues as far as the Gannes summit near post 86, the rate of ascent varying generally between 1 in 500 and 1 in 250. The summit once past, there is a long descent as far as post 127, usually at 1 in 250 and 1 in 333, except for 2½ km. of level line beginning at post 91 and two short ascents about posts 103 and 121. From post 127 the line undulates with a falling tendency as far as Picquigny (145 km. from Paris), whence it keeps very much the level of the canal near which it runs as far as Abbeville (175 km. from Paris).

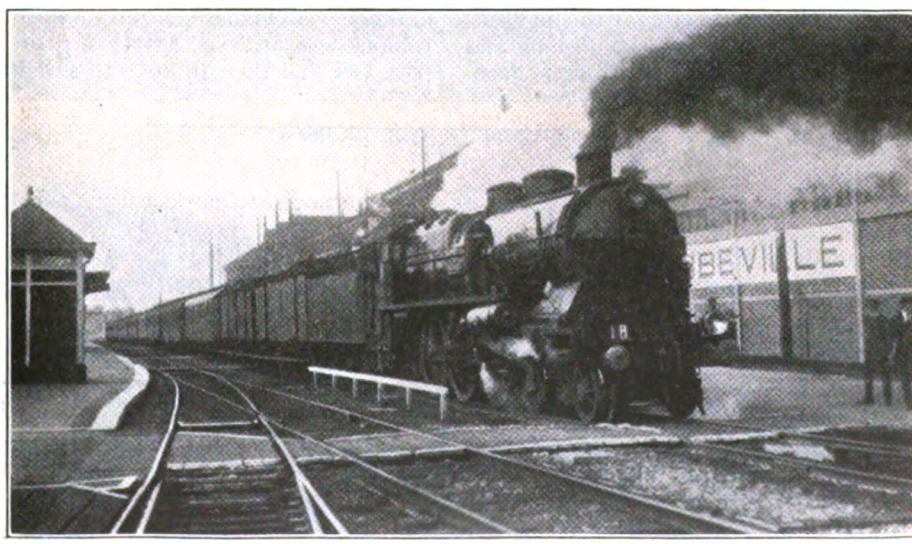

Photo.] [*W. H. C. Kelland.*

CALAIS-PARIS EXPRESS TAKING WATER AT ABBEVILLE.

New 4 6-2, No. 3.1230.

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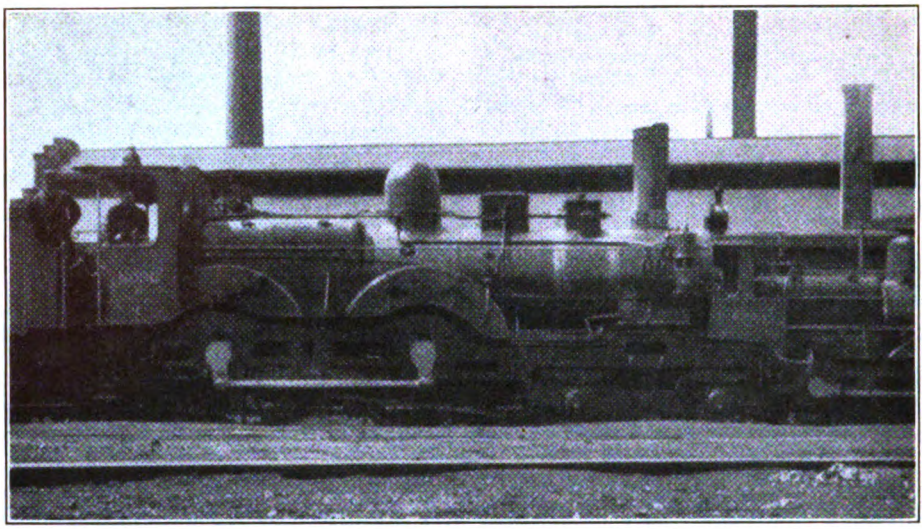
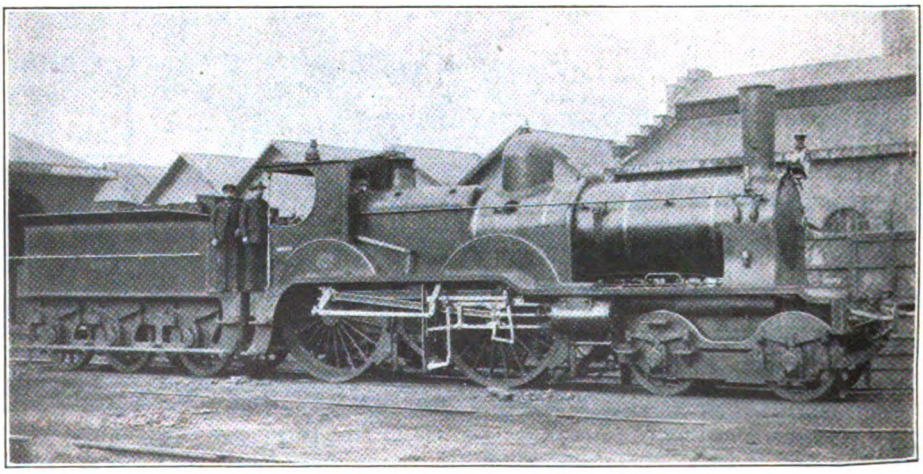


OLD INSIDE CYLINDER 4-4-0 No. 2,821.

Between Abbeville and Etaples (226 km. from Paris) there are only slight undulations. From Etaples to post 238 there is an almost continuous ascent, at about 1 in 500 as far as kilometre 233, but after that at 1 in 135. There is then a fall at 1 in 140 to post 244, after which the line is nearly level as far as Boulogne. Between Boulogne and Calais the gradient is nearly everywhere 1 in 125, with summits at posts 258, 265, and 278. The last summit (the Caffiers summit) is by far the highest; it is reached by a climb 10 km. long and succeeded by a fall 11 km. long. From post 290 the line is level for the rest of the way to Calais (Pier), which is 297·3 km. from Paris.

The main line to the Belgian frontier, after branching off from the Paris–Calais line at Creil, is nearly level as far as kilometre 128, then rises at 1 in 333 (with little bits of level) to kilometre 146, and falls at 1 in 333 to St. Quentin (153 km. from Paris). Hence to kilometre 163 bits of level alternate with short ascents; from kilometre 163 there is an almost continuous rise at 1 in 200 to a point near post 178, and then 10 km. fall at 1 in 333.



ONE OF THE ORIGINAL DE GLEHN 4-4-0 COMPOUNDS.

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After this the line undulates with a falling tendency as far as the Belgian frontier.

The Lille main line, which leaves the Paris–Calais line at Longueau (126 km. from Paris), first of all rises very gently as far as kilometre 148, then rises on gradients that are continually varying, but average about 1 in 500, to post 176. After that there is a very decided but extremely broken fall past Arras (192 km. from Paris) as far as Douai (218 km. from Paris). Between Douai and Lille (251 km. from Paris) there are continuous short undulations.

There are service slacks at Creil, Amiens, and Longueau (for the Lille line only).

The main lines are signalled on the block system in accordance with the rather complicated code usual in France (which varies slightly on the lines of the different companies). There are three kinds of signals that are used to convey to the driver the order to stop. They are of different degrees of urgency :—

(1) The red-and-white chessboard signal. This signal, if at "danger" must never be passed. A green-and-white chessboard is used as a distant signal to give warning of the position of the red-and-white chessboard.

(2) The semaphore. This signal may be passed, but indicates that the line is not clear ahead.

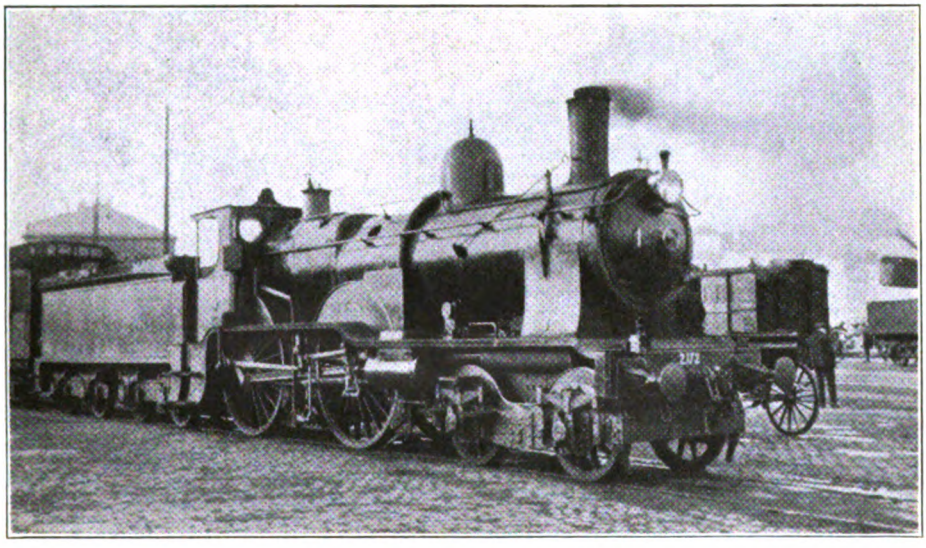

Photo.] **4-4-0 No. 2,172 AT BOULOGNE.** [*W. H. C. Kelland.*

Facing points must never be traversed at a speed higher than the average running speed of the train as defined in the official time-table.

The principal main lines are laid with flat-footed rails weighing 91 lb. per yard, and the ballast is broken stone. During the war the traffic on so much of the Nord lines as was not destroyed was of an exceedingly heavy character, and at the end of the War extensive relaying was necessary. Good progress has been made in relaying the main lines with rails of the hitherto exceptional length of 24 m. (78 ft. 9 in.). These rails, owing to the reduction in the number of rail joints which their use involves, make a very fine road.

(3) The red disc with a white edge. When this signal is at "danger" it must be passed, but the train must be pulled up as soon as it has got under the protection of a post placed some 600 or 700 yards beyond the red disc, unless in the meanwhile permission to proceed has been given by hand signal by the signalman posted at the entrance of the next block section. The red disc is generally used as the distant signal before a semaphore.

There are also, of course, a number of other signals the use of which need not here be examined.

When a signal is at "line clear" it is in

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all cases, except that of the semaphore, turned edgewise to the approaching train and becomes almost invisible at a distance. The semaphore shows "line clear" by hanging vertically downward in line with its post.

By night "danger" is shown by various red and green lights. "Line clear" is in all cases shown by a single white light.

The Chemin de fer du Nord has always provided an express service better than that of any other French railway, and from December, 1896, when the Scottish expresses were slowed by agreement between the East Coast and West Coast companies, its services have usually been ahead—sometimes far ahead—of anything to be found in Great Britain, on account both of booked speed and of the far greater amount of time that has been made up when the trains have been late.

Up to the end of the '80s of last century there was nothing very distinctive about the express engines of the Nord beyond the fact that the latest types had bogies and inside cylinders. But in the late '80s the question of adopting compound engines came very much to the fore in France, and the earlier steps in this direction were taken almost entirely by the Nord and the P.L.M. In 1891 the Nord brought out a 4-4-0 4-cylinder compound express engine, which was the prototype of the numerous engines of the same general design which it has since acquired. Except for increased size, more wheels, somewhat higher steam-pressure, and the addition of superheaters, the latest Nord express engines differ only in details from the pattern of 1891.

The engine brought out in 1891 was not indeed the first 4-cylinder compound built for the Nord. A little experimental engine (No. 701) came out in 1886. She was originally a 6-wheel machine, and subsequently was rebuilt with a bogie. So far as I know she has not yet been broken up. I saw her at Lille in 1919. She differs considerably from the other Nord 4-cylinder compound engines, having high-pressure cylinders inside the frames, low-pressure cylinders outside, no coupling rods and only 156 lb. pressure.

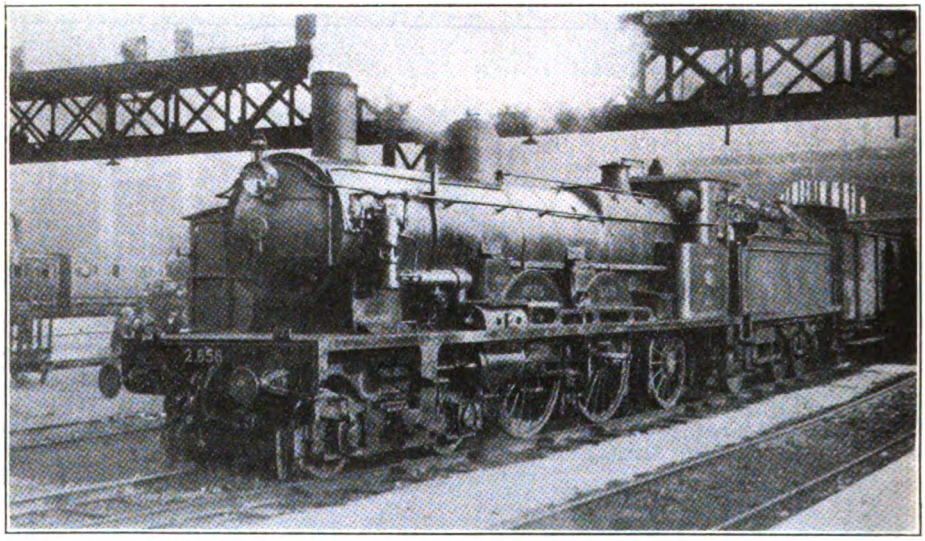

Photo.] [*W. H. C. Kelland*

4-4-2 No. 2.658 AT GARE DU NORD, PARIS.

The next 4-cylinder compounds to be built were the engines of 1891, already referred to, and one sister engine (2.121 and 2.122). These engines had a boiler pressure of 199 lb. per sq. in.

After that came a batch of 15 engines, similar to No. 2.121 with 199 lb. pressure (2.123–2.137); then 20 more with 213 lb. pressure (2.138–2.157), but otherwise similar to the others; then a small

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class of three bigger engines (2.158–2.160), and finally 20 more, rather bigger still (2.161–2.180). These last 23 machines all had 213 lb. pressure.

In 1900 the first two 4–4–2 engines came out, No. 2.642 being shown at the Paris Exhibition, and No. 2.641 being at once set to work. Thirty-three more of these engines (2.643–2.675) were subsequently built. All had 227 lb. pressure.

From about 1907 a number of experiments were made with an engine with a water-tube firebox and 256 lb. pressure (No. 2.741). She has since been rebuilt as a 4–6–0 (No. 3.999) with an ordinary boiler.

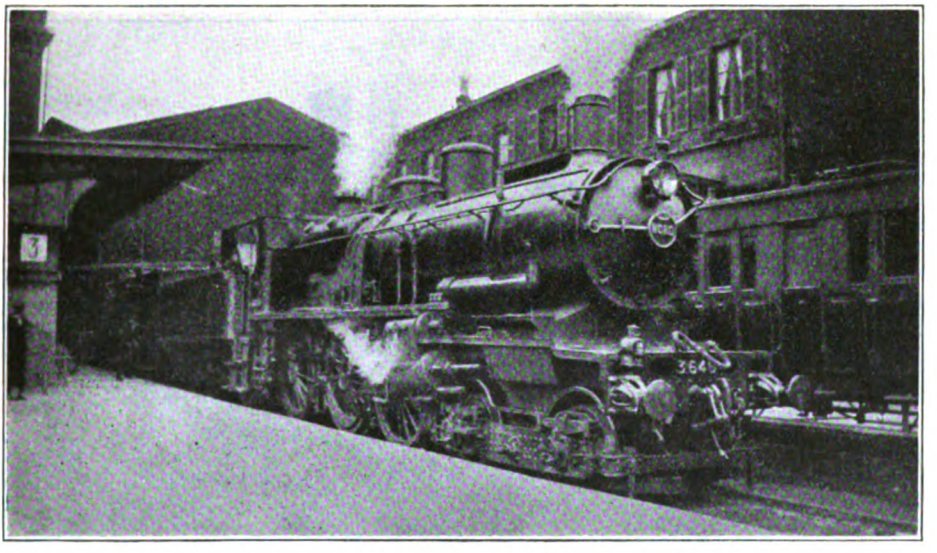

Photo.] [*C. F. E. Harvey.*

4-6-0 No. 3.645 AT GARE DU NORD, PARIS.

About 1910 two very big 4–6–4 engines, fitted with superheaters were built, one with a water-tube firebox, which has since been removed.

In 1912, 20 4–6–2 engines with superheaters (3.1151–3.1170) made their appearance, and about 1924 some much larger 4–6–2 superheater engines came out; of these latter there are 40 (3.1201–3.1240). All the 4–6–2 engines have 227 lb. pressure.

Meanwhile the 4–4–2 engines have been rebuilt with superheaters.

All the foregoing are express engines and have driving wheels between 6 ft. 3 in. and 7 ft. in diameter. There are also a large number of 4–6–0 4-cylinder compound engines with smaller wheels. Some of these frequently work express trains.

Up to nearly the end of the 19th century the ordinary French passenger carriage was a 4- or 6-wheel vehicle, without corridor or lavatory. On the Nord the carriages used for express trains were 4-wheelers and weighed round about 14 tons. About 1899 the 32-ton corridor carriage, running on two 4-wheel bogies, was introduced for express trains. This is a thoroughly comfortable and satisfactory vehicle, and remained standard till the end of the war. Since then a good many surrendered German carriages, also running on two 4-wheeled bogies, have come into use. They weigh about 44 tons each, and run, in my experience, extremely well.

As regards both engines and carriages the French railways derive great benefit from the liberal dimensions of the loading gauge, which enables vehicles to be used with an extreme height of 14 ft. and an extreme breadth of slightly over 10 ft. It is probably the fact that French railways were developed somewhat later than British railways that made it possible for the French to profit by our mistakes and adopt a loading gauge of more adequate dimensions than our own.

In 1896 I had several runs on the Nord as an ordinary passenger, and was sur-

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prised at the excellence of the work of the compound engines. With about 180 tons behind the tender the 102 miles from Calais (Town) to Amiens were run, start-to-stop, in 111 min., and with about 150 tons in 112 min., a considerable amount of time being made up on both occasions. The continuation of the former run to Paris was not specially interesting, but the continuation of the latter was remarkable. The distance of just over 81 miles was performed in 85 min., start-to-stop. At that period of my career I did not possess a stop-watch, and the details which I noted were scanty. I find, however, that Creil was passed 50½ min. from the start at Amiens (49½ miles), and that a slack took place between Creil and Paris. The engine was No. 2.159, one of the small class of three engines which were bigger than the first lots, but not quite so big as the final lot of twenty 4-4-0 engines (2.161–2.180).

The first time I travelled upon the footplate of a Nord engine was in June, 1898, from Amiens to Paris. The engine was No. 2.163, belonging to the last-built and most powerful class of 4-4-0 engines. The train was composed of 14 four and 6-wheel vehicles, and weighed 187 tons behind the tender. The booked time to Paris was 103 min. We left Amiens about a quarter of an hour late, and did not get into speed very quickly, taking nearly 4 min to pass post 128 (1½ miles, all level). Soon the gradient changes to 1 in 333 up, and on this the speed steadily rose. The short dip beyond Boves station sent it up to over 60 m.p.h. at kilometre 121, and from here to kilometre 85, just beyond the Gannes summit, the average speed was exactly 60 m.p.h. (In these 36 km. the vertical rise is about 270 ft.) The long descent to Creil was then taken very easily, speed only just touching 70 m.p.h. in one place, and Creil (49½ miles from Amiens) was passed in 50½ min. from the start. Beyond Creil is the hardest part of the run, the gradient between posts 48 and 27 averaging 1 in 220 up. Here for the first time the speed was really below 60 m.p.h., the 21 km. occupying 14 min. 7 sec.; the speed thus averaged 55·4 m.p.h., and it did not fall below 53 anywhere. The succeeding 20 km. are all downhill, and were run at an average speed of just under 71 m.p.h., the highest speed reached being 74½ m.p.h. Post 7 (76¾ miles from Amiens) was passed in 76 min. 55 sec. We had now made up more than all the time lost before Amiens. The signalmen were not ready for us, and we were stopped outside the Gare du Nord, having run rather more than 80½ miles, start-to-stop, in 82 min. 10 sec.

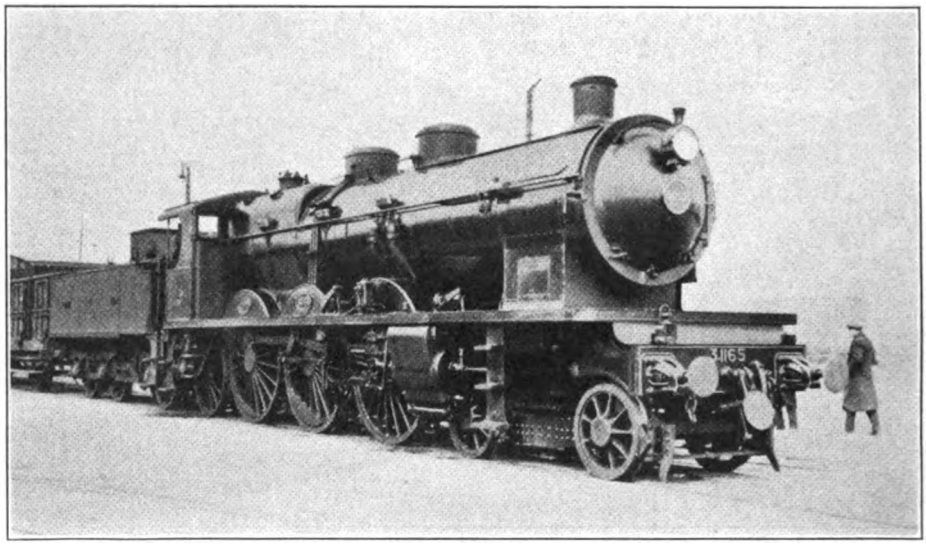

Photo.] 4-6-2 No. 3.1165 AT BOULOGNE. [*W. H. C. Kelland.*

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The whole way steam had been cut off at 50 per cent. of the stroke in the high-pressure cylinders, and at 65 per cent. of the stroke in the low-pressure cylinders; the regulator had been wide open uphill. Pressure had been kept near the blowing-off point of 213 lb. per sq. in.

Except for the run of Nord engine 2.159 over the same line, which I have already referred to, this performance was vastly superior to anything I had before witnessed, and was a fitting introduction to the yet more remarkable feats that were to follow.

It will be observed that the downhill work was of quite an ordinary character, and that it was the uphill work alone that was so striking.

The 4-4-2 engines are so famous, and their work has so often been described, that I will not relate any of their feats in detail, but will content myself with just mentioning some of the best that I have witnessed, all of which took place before these engines were fitted with superheaters. (Since they were so fitted, most of the hardest work has been entrusted to bigger engines).

No. 2.645, with 171 tons behind the tender, ran from Paris to Amiens in 73 min. 33 sec., start-to-stop. Longueau (78¼ miles) was passed 68 min. 6 sec. from the start, but about 2 min. 10 sec. were lost between Longueau and Amiens on account of the permanent way being under repair.

The next day No. 2.642, with the same train, completed the same run in 75 min. 20 sec., with a less severe delay between Longueau and Amiens.

No. 2.659, with the Nord Express, weighing 275 tons behind the tender, was pulled up, owing to one of the axles in the train having run hot, 87 min. 37 sec. after leaving Paris. As nearly as possible 87⅝ miles had been covered, the start-to-stop speed thus averaging exactly 60 m.p.h.

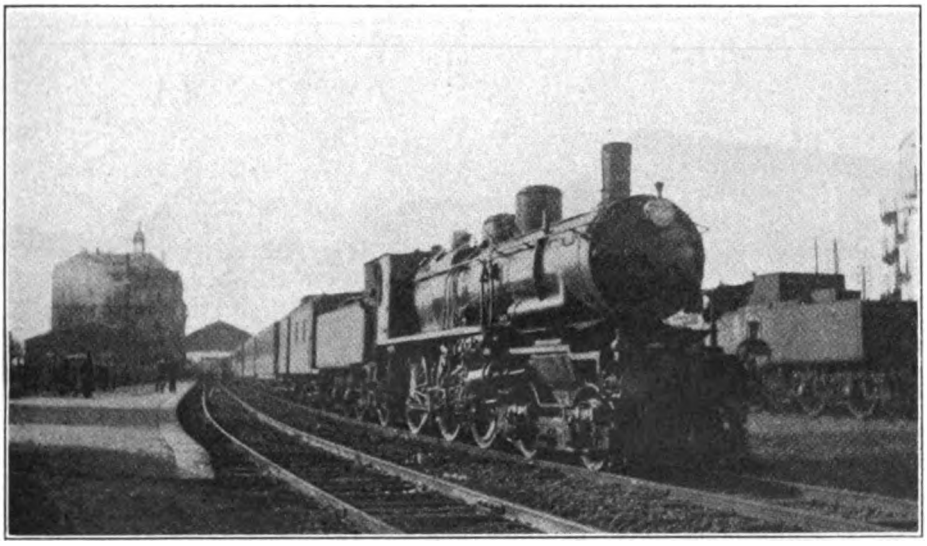

Photo.] [*J. Macartney Robbins.*

CALAIS-BRUSSELS EXPRESS AT CALAIS (MARITIME), 4-6-0 No. 3.648.

This train includes a through carriage to Basle (via Brussels) and Luxembourg.

The vehicle that had failed was dropped at St. Quentin, and the weight of the train was thus reduced to 235 tons. The departure from St. Quentin took place 16 min. behind time; 8 min. were made up before Jeumont, the 52¾ miles being run, start-to-stop, in 50 min. 5 sec., and the remaining 8 min. were recovered between Erquelinnes (the station on the Belgian side of the frontier), and Charleroi.

No. 2.654, with 219 tons, ran 33¼ miles from Abbeville to a signal stop at post 228.9 in 31 min. 58 sec. The stop was made very slowly. For 22 miles of level line the speed had averaged 73 m.p.h.

No. 2.668, with 257 tons, was twice

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stopped by signal between Paris and Arras. After the first stop she ran the remaining 43¾ miles to Longueau in 41 min. 19 sec., and after the second, the remaining 40½ miles to Arras in 39 min. 13 sec.

As already remarked, the Nord, about 1907, built an engine with a water-tube firebox. Advantage was taken of the strength of this form of firebox to raise the pressure of the steam to 18 kilog. per sq. cm. (256 lb. per sq. in.). A good many difficulties were encountered both with the boiler and in the matter of the general design of this engine, but eventually a 4-4-4 machine was evolved that could be used to work the best trains. The cylinders and driving wheels were similar to those of the 4-4-2 engines. The water-tube firebox was made of two drums (one on either side of the grate) below, and one above, joined together by 502 water-tubes of 1⅜ in. external diameter, so arranged as to leave above the grate a space corresponding to an ordinary firebox. The rear part of the boiler-barrel was occupied by a combustion-chamber partly separated from the firebox by a curtain of water-tubes, and the front part contained fire-tubes in the ordinary way—136 ribbed tubes of 2¾ in. external diameter, and 14 ft. 1 in. long. The grate was about 7 ft. 3 in. long and 5 ft. 4 in. wide, with an area of 38 sq. ft. The heating surface of the water-tubes and drums was 1,033 sq. ft. and the total heating surface 3,346 sq. ft. The height of the centre-line of the boiler barrel above the rails was 9 ft. 2 in. The engine weighed 76 tons in working order.

In March, 1910, this engine was run on the 9.50 a.m. train, Paris to Calais, and the 1.15 p.m. train, Calais to Paris, on alternate days, with a new 4-6-0 4-cylinder compound engine with 213 lb. pressure, fitted with a superheater, which was borrowed from the Chemin de fer de l'Est (No. 3.152). I travelled with both engines.

The first day the Est engine had 311 tons behind the tender. Making rather a quicker start than usual from Paris, she passed kilometre post 1 in 2 min. and post 7 in 6 min. 22 sec. Then, with the regulator wide open and steam cut off at 60 per cent. in the high-pressure cylinders and at 68 per cent. in the low-pressure cylinders, she traversed the 20 km. to post 27 in 12 min. 53 sec. (58 m.p.h.). The 27th km. took exactly 40 sec. (55·9 m.p.h.). Downhill the pace soon rose to 75 m.p.h.; post 48 was passed 30 min. 21 sec. from the start, and post 51, after the service slack through Creil station, 2 min. 8 sec. later. Uphill to the Gannes summit the engine did not work quite so hard as she had worked going up to the Survilliers summit, the regulator not being wide open and steam being cut off at 58 instead of

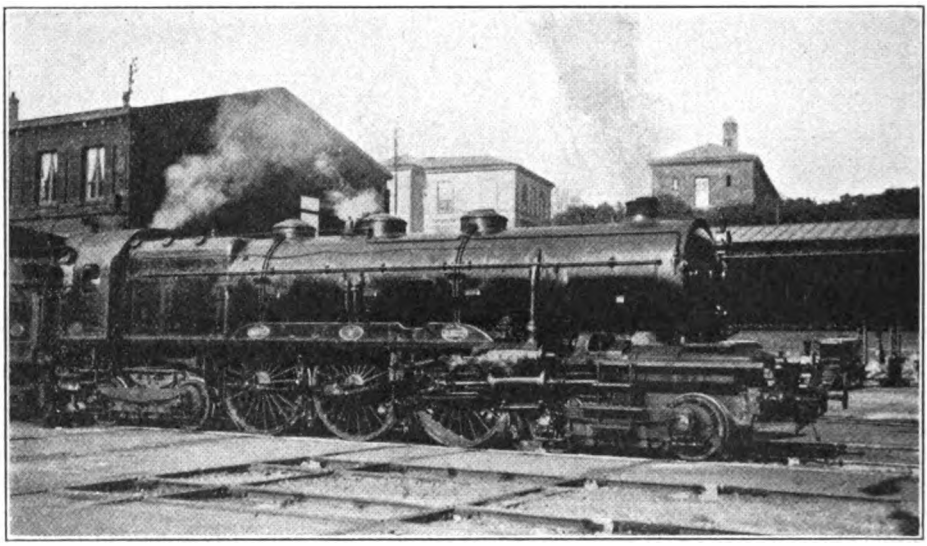

Photo.] **4-6-4 No. 3.1102 AT GARE DU NORD, PARIS.** [*W. H. C. Kelland.*

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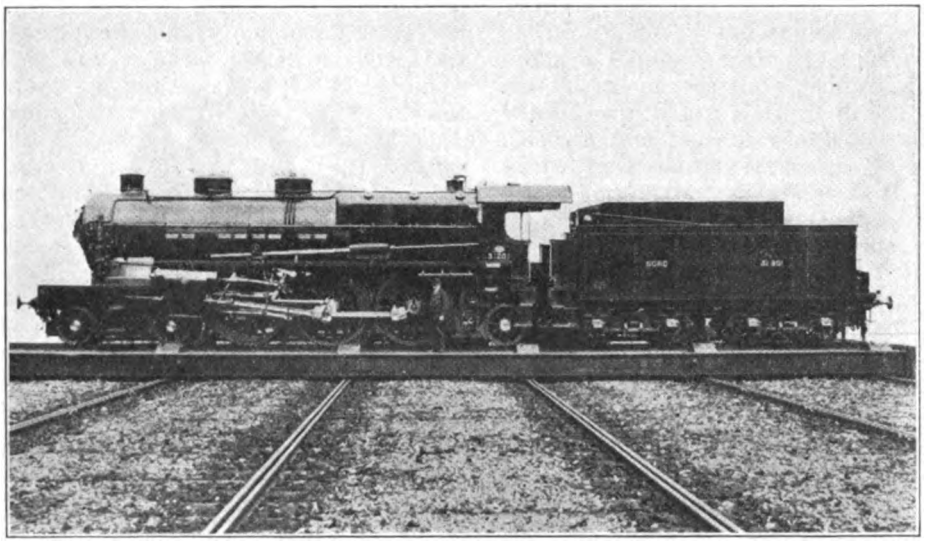
60 per cent. in the high-pressure cylinders. Posts 54 to 86 took 19 min. 29 sec., which is about 61¼ m.p.h., and the last 19 of these took 11 min. 43 sec—a little over 60 m.p.h. Downhill to Longueau, 70 m.p.h. was the average speed for 35 km. from post 90, and Amiens was passed 79 min. from the start. Easy running along the Somme Valley and a very slow stop landed us at Abbeville 107 min. 25 sec. from Paris (109 miles).

The next day I accompanied the Nord engine, and I went this time as far as Calais. The train weighed 298 tons. As far as Amiens, which was passed 80 min. 55 sec. from the start, the work was slightly slower than that of the 4-6-0 engine had been on the previous day. One reason for this was that No. 2.741, when working very hard, was found to use water so fast that it was necessary to be economical of water in order to be sure of having enough to complete the 109 miles' run to Abbeville. A probable explanation of this is that when the boiler was generating more than a certain amount of steam a minute the circulation in the water-tubes was so furious that a very large amount of water rose with the steam and was carried over into the cylinders. After Amiens, when it became apparent that water need no longer be economised, the work became more interesting. A speed of 60 m.p.h. was soon reached, and the 142nd km. was run at just 70 m.p.h. With the regulator rather more than half open, and steam cut off at 48 and 65 per cent., the speed remained about 70 m.p.h. for some distance, but about post 158, down a short incline, it rose above this point and, the regulator being gradually opened wide, continued to rise along the level till, at post 170, the 120 km. per hour limit was reached and kept for 2 km. (Posts 170–172 in 1 min. exactly.) All this time steam continued to be cut off at 48 and 65 per cent. After this the regulator was shut, preparatory to stopping at Abbeville, where we drew up at the water-column 108 min. 30 sec. from the start. Thirty-two km. from post 141 to post 173 had been run in 16 min. 17 sec., which is just under 72 m.p.h., and 13 km. from post 160 in 6 min. 35 sec., which is just under 73 m.p.h.



ENLARGED 4-6-2 No. 3.1201.

Starting again from Abbeville, after a stop of rather more than 5 min., 60 m.p.h. was attained about km. 182 and 70 m.p.h. about km. 190. Here the regulator was two-thirds open, and steam cut off at 50 and 68 per cent. The regulator was subsequently opened wide, and the high pressure cut off increased gradually to 65 per cent., but on account probably of the clogging effect of the ever-increasing

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quantity of water carried over with the steam, the speed did not rise nearly so high as might have been expected in the circumstances, and only just reached 120 km. (74½ miles) per hour for 1 km. There was, it is true, a pretty strong side wind as we neared Etaples. After Etaples the regulator was kept wide open, and the cut-off in all four cylinders was 65 per cent. For some distance uphill the speed kept very little under 70 m.p.h. The 232nd km. took 33 sec. (67¾ m.p.h.), and the 233rd took 33⅗ sec. (66½ m.p.h.). Here, however, the line begins to rise at 1 in 135, and continues so to about post 238. These 5 km. took 3 min. 4⅗ sec., and the last two 39⅖ sec. and 39⅕ sec., respectively. So the speed was nowhere less than 56¾ m.p.h. Fifty km. from post 186 had been run in 26 min. 32 sec., which is 70 m.p.h. Post 238, 39 miles from Abbeville, was passed 36 min. 52 sec. from the start. (In this distance the train had been lifted about 175 ft. against gravity.) We were thus well before time, so, to put us back a little, we ran without steam downhill towards Boulogne, and quite easily for some distance more. Unfortunately, we were even thus too soon, and just as we had begun to ascend the Caffiers bank we found a red disc signal against us, and were quickly brought to a stand at post 269·3. We had run 58½ miles from Abbeville in 57 min. 32 sec. As we had been stopped on a curve on a rising gradient of 1 in 125, and had only 34 tons' adhesion weight, we had some difficulty in starting again, but after one or two attempts we got off and set to work to climb the Caffiers bank from a stand. Steam was cut off in all four cylinders at 65 per cent., with the regulator wide open, and the speed rose kilometre by kilometre till posts 275–277 were done in 100 sec. for the two, and the 278th km. in 47⅖, which is 47 m.p.h. Post 278 was passed 10 min. 19 sec. from the fresh start at post 269·3.

4-6-2 No. 3.1154 ON PARIS-BOULOGNE EXPRESS.

From the above it is evident that the decision of the Nord authorities not to adopt the water-tube firebox was in no way due to any inability on its part to do the work required. It seems to have been too complicated to be satisfactory, and its cleaning was a difficult matter.

In 1913 I had a number of runs on the new 4-6-2 engines of the 3.1151 class. I have described these runs so often that I will here only just recall that the engines showed themselves capable of passing the Survilliers summit at 65 m.p.h. and the Gannes summit at 69 m.p.h. in either direction when hauling loads of 300 tons

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behind the tender. The engines were of course worked very hard—on one occasion, for instance, when the engine was running at 68 m.p.h. and the pressure in the boiler was just upon blowing-off point, steam was cut off in the high-pressure cylinders at 70 per cent. and in the low-pressure cylinders at 72 per cent. of the stroke, the regulator being as usual wide open—but the boilers furnished all the steam required without difficulty. No special measures were taken, such as the provision of superior fuel or the making up of a specially built-up fire in the running-shed.

After the War the French Government endeavoured to make all the different French railways adopt engines of the same design. The design favoured for express engines was the 4-6-2 4-cylinder compound type of the State railways. The Est and the Paris-Orleans lines acquired a good many of these, but the Nord and P.L.M. seem to have held out and the idea of standardising the engines seems now to have been completely abandoned. Perhaps on account of delay caused by some difference of opinion with the Government as to design, the Nord took a long time to work out a new design of express engine, and it was not till 1923 that new 4-6-2 engines began to be delivered, and they were not put into regular service before 1924.

The new engines are numbered 3.1201–3.1240. Their most remarkable feature is the long grate which lies between the frames in the ordinary manner. It is 11 ft. 6 in. long and has an area of 37½ sq. ft. The heating surface of the firebox is 218 sq. ft. The barrel of the boiler, 14 ft. 10 in. between tube plates, has a mean internal diameter of 5 ft. 9 in. and contains 30 superheater flues 5¼ in. in diam., 95 serve tubes 2¾ in. in diam., and 21 ordinary tubes 2¼ in. in diam., with a combined water-heating surface of 2,440 sq. ft. The heating surface of the superheater is 615 sq. ft. The steam blows off, as usual, at 227 lb. per sq. in.

The high-pressure cylinders are 17⅜ in. by 26 in. and the low-pressure cylinders 24⅜ in. by 27¼ in. They are all slightly inclined.

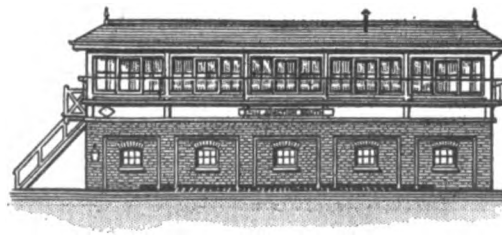
The weight of the engine in working order is 93 tons, with 54½ tons equally distributed on the three pairs of driving wheels, which are 6 ft. 3 in. in diam. The rear four pairs of wheels are all connected by equalising levers.

The top of the chimney is 13 ft. 11 in. above the rails, the centre-line of the boiler 9 ft. 2 in., and the engine buffers 3 ft. 4¾ in.

The tender, which was handed over by the Germans on reparation account, runs on two 4-wheel bogies, weighs 62 tons in full working order, and carries 31 tons of water and 7 of coal.

(A recent table of weights which has reached me shows both engine and tender to be about 2 tons heavier than stated above.)

(To be continued.)



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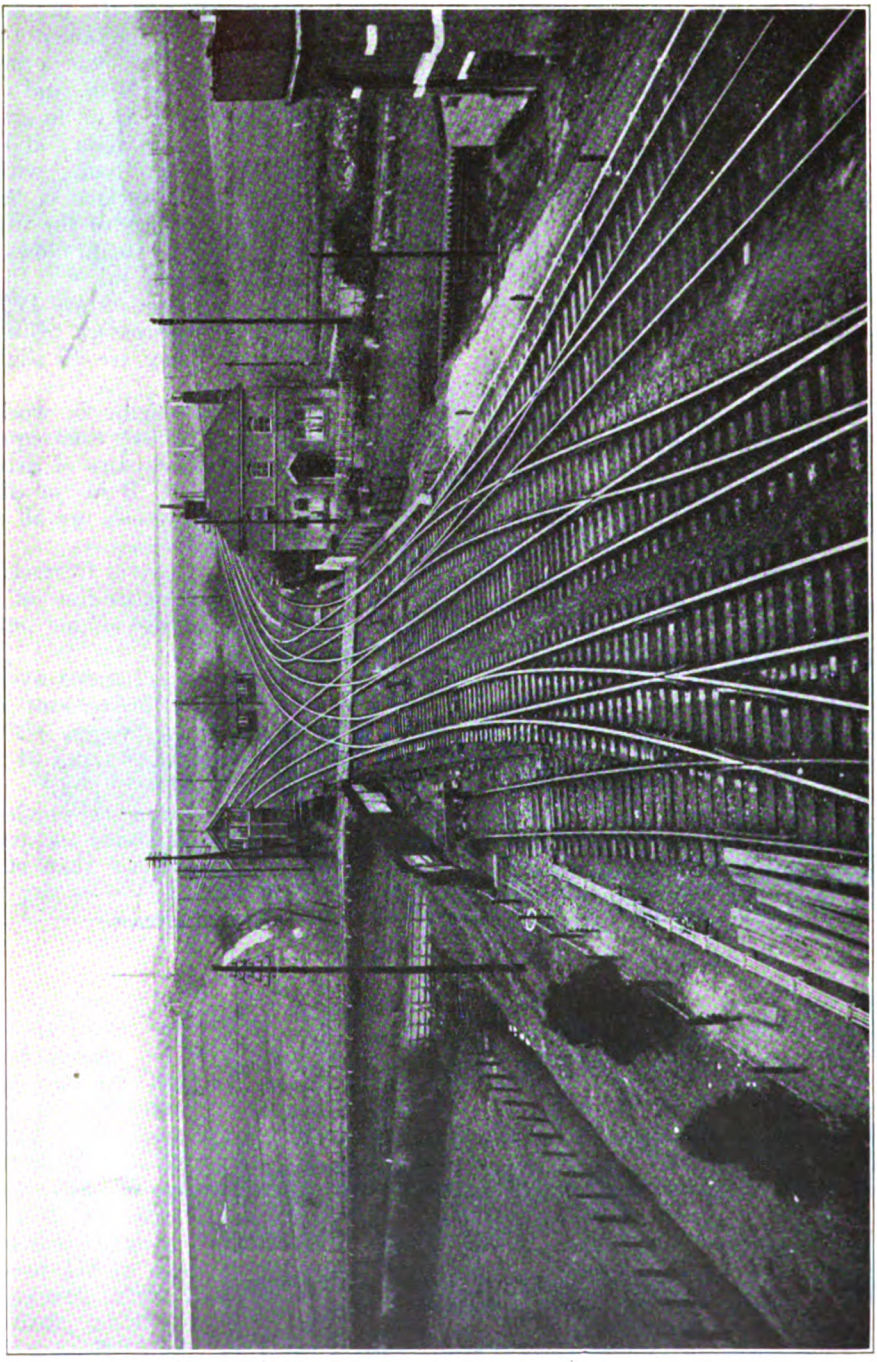

GENERAL VIEW OF SOUTH JUNCTION, MANNINGTREE. HARWICH BRANCH TO RIGHT.

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Signalling Developments on the L. & N.E.R.

WITH the development of power signalling, with adequate detection and indication of points, coupled with the use of track diagrams working in conjunction with track circuits, it has come to be realised that signalling practice now permits of many developments, in the interests of both economy and efficiency, which a few years ago would have been regarded as impracticable, or, if practicable, as involving elements of risk and uncertainty. Thus, there are now many instances where points beyond the regulation distance from a signal-box are worked by power, and quite a number of installations where, with the aid of indicating diagrams and track circuit, signalmen are able to control with perfect safety traffic movements which, if not actually out of sight, are not within range of ordinary observation.

As a result, there are now several installations—the more important have already received attention in the RAILWAY MAGAZINE, where junction points are worked from a station cabin, whereas formerly it was necessary to provide another cabin adjacent to the actual junction, while, in other instances, it has become possible to close one or more of several boxes previously required to control operation within a complex area, such as that of a triangular junction, with or without other connections.

In the main, the controlling principle has, of course, been that of economy, but in many, if not most, instances where changes in the direction indicated have been made, the question of traffic operating convenience has been equally, if not more, important. Thus, where a junction box within a short distance of a station box has been closed, it can usually be said that the only justification for the junction box was that the contiguity of the junction necessitated its provision and staffing, though, normally speaking, it is more convenient that station and junction movements should be under the direction of one cabin. Similarly, a triangular junction usually means that three, if not more, cabins have to be provided within a limited area, while movements round either side involve the co-operation of two or more signalmen whereas the situation as a whole is greatly simplified where control is concentrated in one cabin.

Matters of this kind have been the subject of very close attention on the part of the signal departments of all leading railways, and the pioneer installations together with recognition of the possibilities which power signalling introduces have led to careful study of signalling problems on new lines. This applies, indeed, to all railways, but has been given special attention on the L.N.E.R., under Mr. W. Clow, C.B.E., Superintendent, Southern Area, and Mr. A. F. Bound, who now holds the office of Signal Engineer, Southern Area.

As a result, several signalling developments of the character indicated have been made on the Great Eastern section of the L.N.E.R., and with the courteous co-operation of Mr. Clow, Mr. Bound, and their respective staffs and other officers of the L.N.E.R., we are able to describe and illustrate two of the more notable of these, one at Manningtree and one at East Gate, Colchester. Both of these represent the realisation of schemes under consideration before Mr. Bound assumed his present position, but they have been carried out under his direction and supervision.

Manningtree is regarded as the junction station for the Harwich branch, but as traffic passes to and from Ipswich, as well as in the London direction, a triangular junction has existed for many years. This was controlled by three signal-boxes—Manningtree South, Manningtree North, and Manningtree West—while work in the fairly busy yard at Manningtree Station was under the oversight of a station box. Normally speaking, all these cabins were within sight of one another, though sufficiently widely separated to render it undesirable to attempt to control two junctions from one box, even if the allowable distance for controlling the operation

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INTERIOR OF SOUTH CABIN, MANNINGTREE.

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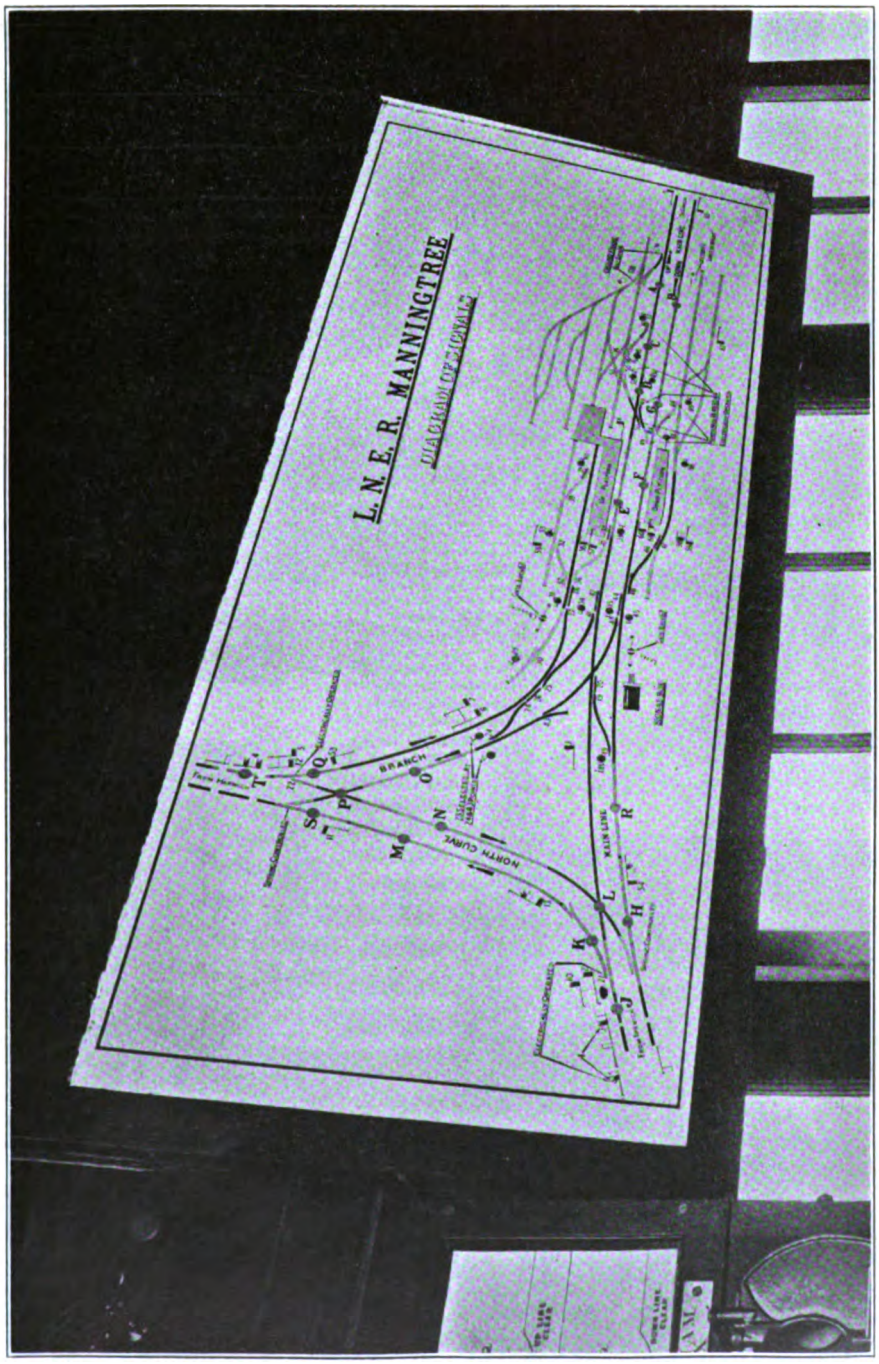

INDICATING DIAGRAM, SOUTH CABIN, MANNINGTREE.

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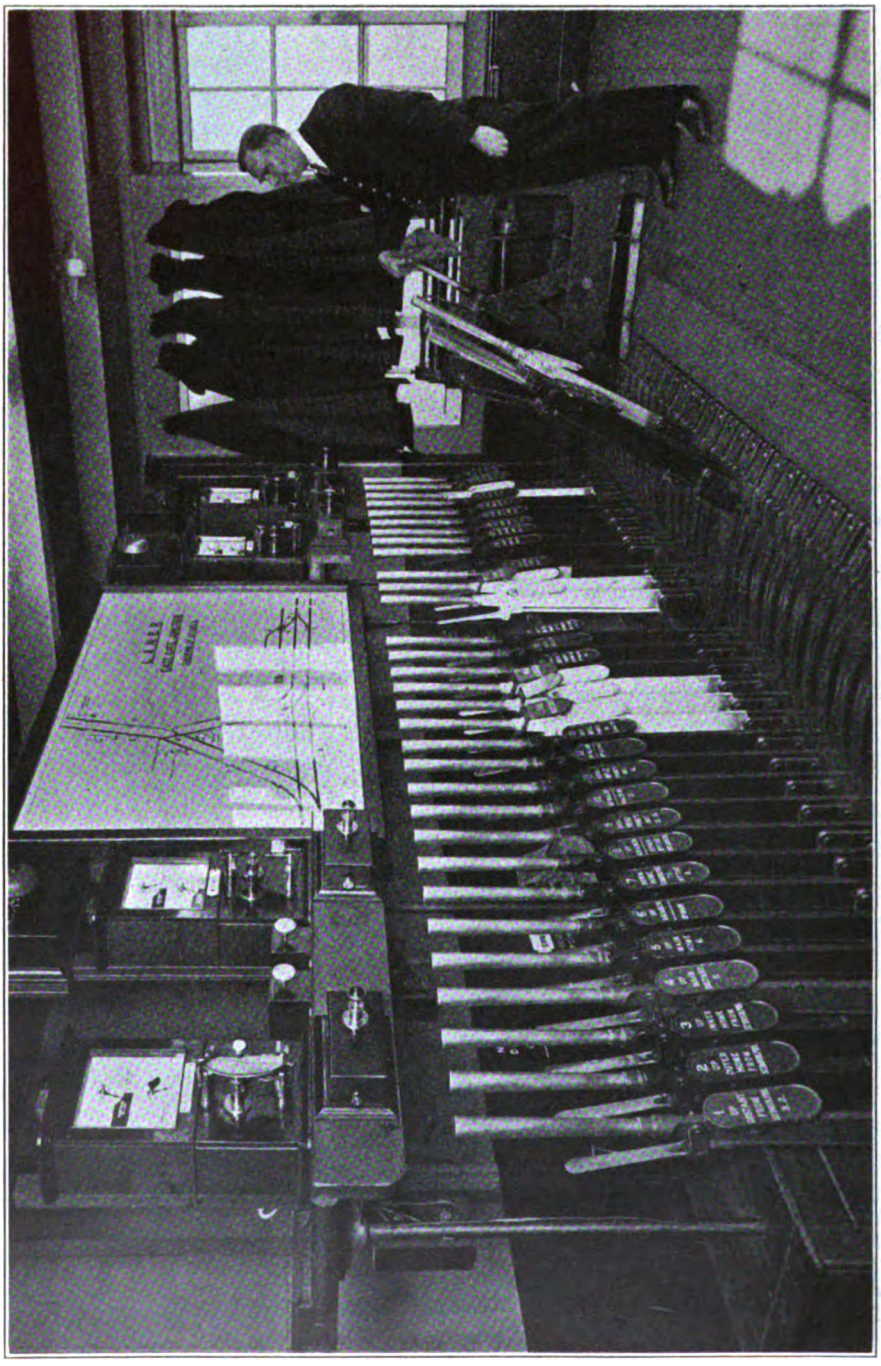

INTERIOR OF EAST GATE CABIN, COLCHESTER.

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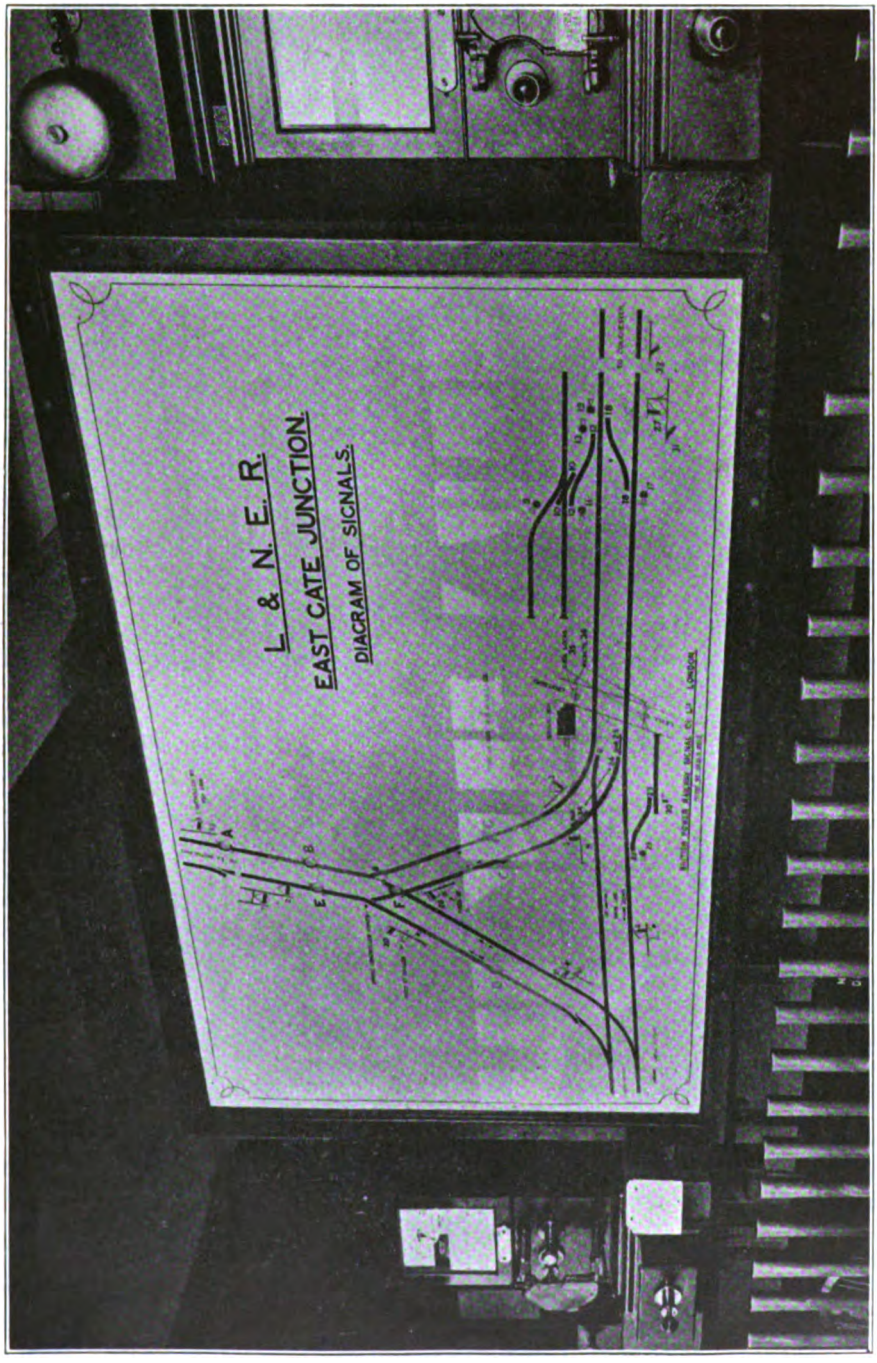

INDICATING DIAGRAM, EAST GATE JUNCTION, COLCHESTER.

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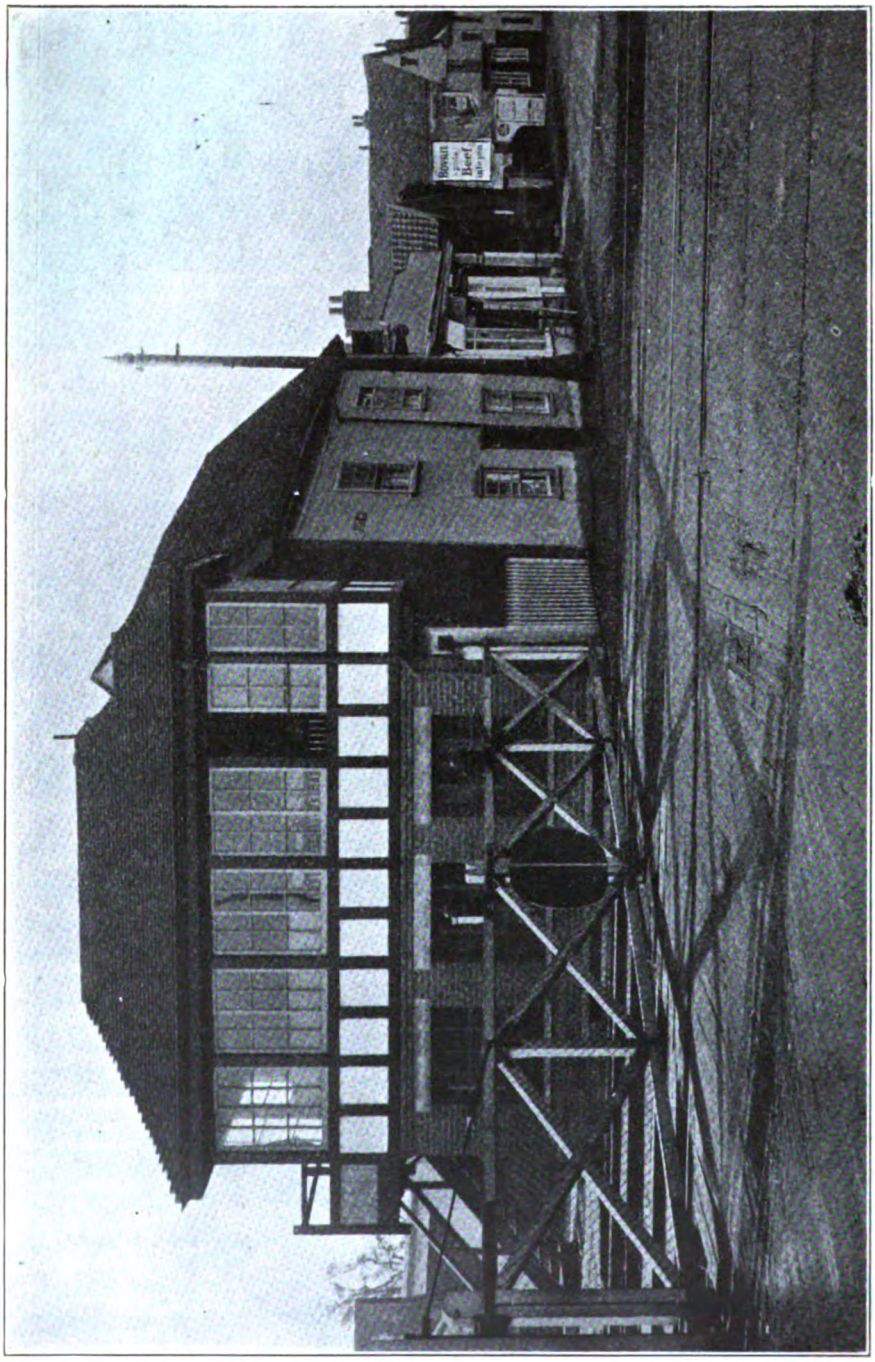

NEW EAST GATE CABIN, COLCHESTER.

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of manual points were not exceeded. By a relatively simple combination of manual and power signalling, with an indicating diagram controlled by track circuit, the work of all four boxes is now concentrated in one—Manningtree South.

This box is adjacent to the South Junction, close to the north end of Manningtree Station. The change has, of course, necessitated entirely new locking, but the material of the old mechanical frame is largely utilised, though a few levers have been added at each end. Moreover, all signals within reach of the box continue to be manually operated, and it is only points beyond mechanical working limits and a remote " distant " signal which are power-worked. As a means of differentiation and to prevent a signalman from hurting himself by pulling over a power lever with the force which a manual lever often demands, the handles of those levers which are associated with power-worked points are shortened.

The main feature of the installation is however, the indicating diagram, which renders it possible to concentrate the work of the four boxes previously in use, together with the arrangements for controlling work in the yard. As will be seen from the signal diagram, each side of the triangle is double-track, while from Manningtree Station connection is given towards Harwich from a bay line on the up side, frequently used by branch trains running between Manningtree and Harwich, though, as a rule, branch trains start from the outside line on the down side. The junctions at Manningtree West and Manningtree North are of a straightforward character. At both these junctions certain distant arms have been abolished, and facing points fitted for power operation, these being in both cases Siemens standard type F point machines, mechanically detected by associated signals and with track-circuit control in place of facing point bars. The trailing points are spring-controlled, and lie normally for the more usual direction of traffic. All the junction stop signals are mechanically operated and electrically repeated in the South Box, but there is a power-worked distant signal on the main line, applying to the principal route from Ipswich. This distant signal is operated by a Siemens' battery machine.

Yard points making connections between the goods yard and the running lines, as also crossovers which may be associated with shunting movement affecting the through lines, are operated by Siemens' point machines. Within the yard itself there is, of course, no need for power operation, and the points, therefore, remain of usual hand types. Movements over the power-worked points which affect the through lines are under the control of the signalman, with whom the shunter communicates by pulling over a lever which operates a mechanical indicator in the signal cabin, thus intimating that a movement over the points is required to be made. One of these levers is placed at the south end of the down platform, the other in the up side yard. A code of bell signals, together with indicators in the signal cabin, is also in use.

Unless the special levers referred to are pulled over, however, which is, of course, only practicable when conditions are favourable, no movements can be made into or out of either yard, and the south cabin at all times has full control over movements affecting the running lines. Track circuit is provided on every essential line, so that occupancy, or otherwise, of every section is shown on the diagram by means of spot light indicators. This diagram is also of Siemens' type.

Electric power is received from the L.N.E.R. power station at Parkeston Quay, and was already available for operating the pumping plant and supplying the station lighting installation. By means of a Hewittic mercury vapour rectifier placed in the pump room below the water tank near the station on the up side, operating in conjunction with the transformer plant in the same building, the three-phase alternating-current supply is converted to 120 volts for operating the point machines, the track circuits and indicators being operated at one-fifth of this voltage.

At Colchester the problem was a somewhat different one, in that, although a triangle is concerned, two junctions only are covered by the new installation, though a further feature is that the new plant has enabled a gatekeeper to be dispensed with. Soon after leaving the North, or main line, station at Colchester, the Clacton-on-Sea branch has a triangular junction, near Hythe, with the line towards

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St. Botolph's Station, in the centre of the town of Colchester. This station (a terminus) is used principally by local trains, though, occasionally, a Colchester-Clacton or Brightlingsea train works into St. Botolphs and out again, instead of making the journey direct.

The new cabin at East Gate deals only with its own junction, and the junction where the curve from East Gate joins the curve from Hythe Junction at Colne Junction. At Hythe Junction itself, the fact that there is a busy goods yard and the character of the traffic rendered it undesirable, if not impracticable, to control operation from East Gate cabin. The latter box, however, not only replaces a cabin which originally stood within the angle of its junction, but also displaces a gatekeeper's house previously required at the point where the main road crosses by a level crossing.

Erection of the new box was itself a problem, in that it had to be fitted into a very limited space, and it was also thought to be desirable that its architecture should harmonise, to some extent, with the old-fashioned buildings and houses in the vicinity. This accounts for the somewhat unusual and distinctive architecture of the box, which is in Old English style, while a further unusual feature is that, at the end nearest the road, the box becomes very narrow, while the roof had to be so constructed that it did not deprive a window in the gable of the adjacent building of light.

The box includes gate control mechanism and a mechanical locking frame controlling East Gate and Colne Junctions. As the direct route from Hythe Junction towards St. Botolphs is not within actual sight of the cabin, the signalman has to depend upon track-circuit indication, while certain special adaptations of block working have had to be introduced, in that he has necessarily to deal with traffic movements, not only from East Gate to Hythe or Colne Junctions, but also between Colne and Hythe Junctions. As in the case of the Manningtree plant, all points in the immediate vicinity of the box are mechanically worked, while Colne Junction has a Westinghouse type point machine with electric point lock for the facing points and spring-control for the trailing points.

All the signals concerned are mechanically operated, those at Colne Junction being electrically repeated in East Gate box. To enable the signalman to give "Train out of Section" to St. Botolphs or Hythe Junction for trains which pass round the remote side of the triangle, track circuit is provided between these boxes on both lines, and is continued to the starting signal at St. Botolphs Station.

The line to St. Botolphs rises sharply after leaving the Junction, and run-back catch points have consequently been provided. These points are fitted so that the flange of any wheel following the derail would break a projection, and thus interrupt the track circuit, which would thus give a continued "occupied" indication, even if a wagon ran so far as to clear the running track.

At East Gate the L.N.E.R. signal department carried out all the work themselves, utilising a Westinghouse point machine and an indicating diagram, comprising material provided by the British Power Railway Signal Co. Ltd. This has several unusual features. The track-circuit indicators are of eye-ball type, but instead of using separate point and signal indicators these are combined with the diagram, so that the position of each signal and the lie of each pair of points are shown directly. Openings are made in the diagram at each position, and behind this a disc is rotated by means of the electrical operating devices provided, so that a miniature signal arm or track section painted thereon assumes the required position with regard to the fixed indications of the diagram. This arrangement simplifies the work of the signalman very greatly, in that, except for block instruments, he has practically every indicator combined with the diagram. At East Gate it has not been thought necessary to use a shortened lever for the power-operated points, as at Manningtree.

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Photo.] **WEMYSS BAY PIER AND STATION, L.M.S.R.** [*C. J. L. Romanes.*
L.M.S. Steamer "Glen Rosa."

Clyde Rail and Steamer Services.—II.

By "INDICATOR."

(*A Map was published in the January number, page* 46.)

TO Ardrossan the Glasgow and South Western route is practically that taken by trains connecting with Clyde steamers at Fairlie and Largs. The special boat traffic at Ardrossan is, however, largely operated by independent trains. Incidentally, the public time-table for this route included an announcement indicating a further peculiarity of Clyde traffic, not so far commented upon. Thus, the 8.45 a.m. from St. Enoch, non-stop to Ardrossan Town, was announced to run on the first of the month only, being restricted to the conveyance of passengers and luggage for Arran. This was, in fact, one of the trains frequently required (but not generally announced) on the first of the month, operated in view of the general practice throughout a large part of Scotland, of changing quarters at the month-end. The usual arrangement is that family parties change for their summer quarters at the month-end, remaining for one, two or three months, those members of a family engaged in business travelling to or from Glasgow under the very favourable season-ticket arrangements or week-end facilities offered by the L.M.S. and L.N.E. Railways in Scotland. There is, therefore, a general interchange on the first of each month, often necessitating the running of additional and relief trains beyond those applying throughout the remainder of the month.

The 8.15 a.m. from St. Enoch is scheduled to run to Ardrossan pier, but the particular trains on this route, apart from the 8.45 a.m. already mentioned, are the 9.5 to Ardrossan Pier and the 9.20 a.m., described as the "Campbeltown Boat Express," to Fairlie pier and Largs, both of the "No luggage allowed" variety. There are also the 12.20 (S.E. which includes a portion for Ardrossan pier, the 1.15 (S.E.), 1.45 (S.O. "No luggage allowed") for Fairlie pier, the 1.14 (S.O.), 1.55 (S.O. "No luggage allowed), 4.50 (S.E.), 5.25 and 9.20 (S.E.) to Fairlie pier. The 5.25, which is also a "No luggage

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CIRCULATING AREA AND BOOKING OFFICE, WEMYSS BAY STATION.

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allowed" train, includes a portion for Fairlie pier. Several of the trains mentioned also serve Largs, which has expresses from St. Enoch at 9.20. 10.8 a.m. (S.O.) 12.50 (S.O.), 1.10 (S.O.), 1.15 (S.O.), 2.0 (S.O.), 3.15 (S.O.). 4.0, 4.55 (S.E.), 5.20 (S.E.), 6.9, 7.15 and 9.20 p.m., some of these, whether in association with Ardrossan or Fairlie trains or operated independently, being also concerned in steamer connections.

In the opposite direction the trains of present interest are those leaving Ardrossan pier at 7.30 (not Mondays), 8.18, 8.40 a.m., 1.15 (S.E.), 1.35 (S.O.), 4.55 (S.E.) and 6.30 (S.O.); from Fairlie pier at 7.50 (Mondays only), 7.58 a.m., 2.5, 5.25, 6.4 (S.E.), and 6.25 (S.O.); and from Largs at 7.28 (Mondays only), 7.35, 8.25, 9.40, 12 noon, 1.10 (S.O.), 2.0, 3.20, 4.25, 5.50 (S.E.), 6.0 (S.O.), 7.10 (S.E.), 7.15 (S.O.), 7.40 (S.O.), 8.0, 8.40 (S.O.), 9.0 (S.E.), and 9.30 (S.O.). A number of these trains have the "No luggage allowed" restriction, and quite a number represent independent provision for each of the steamer ports. In other instances, Largs trains may be combined with Fairlie pier sections, and, in some cases, Ardrossan and Largs or Fairlie portions are combined at Ardrossan Town.

It may be mentioned that trains on this route connect with steamers at Winton pier, Ardrossan, practically end-on to the Pier station. Fairlie pier is on a branch curving from the through line, and trains booked to serve Fairlie have to back out to proceed to Largs or back into the Pier station on their way from Largs. This route, it may be mentioned, was dealt with in THE RAILWAY MAGAZINE for January, 1922.

So far as this particular group of steamer stations is concerned, the Caledonian route is alternatively available in regard to Ardrossan, where the station connects with Montgomery pier, close to Winton pier, but having an entirely different railway approach. Among special expresses on this route may be mentioned the 8.30 a.m. and 1.8 (S.O.) p.m. special boat trains for Clyde traffic, together with the 11.0 a.m. Isle of Man express on Mondays and Wednesdays, and the 10.15 p.m. (Fridays only) Isle of Man express, together with the 10.30 p.m. (S.E.) night mail train in connection with the Belfast steamer. In the opposite direction the more interesting trains are the 4.20 a.m. Belfast night mail, the 6.30 a.m. Isle of Man express (Mondays only), 8.15 a.m. (Mondays only), 4.10 (Tuesdays and Fridays only), Isle of Man express, and the 7.50 p.m. running on certain dates in the month in connection with a daylight service to Belfast. There are, however, a number of other trains having pier connections, though they are rather of a semi-fast than a stopping character, in that some of the trains by this route are run more particularly for the benefit of passengers who cannot alternatively use the Glasgow and South Western route. An interesting feature, though it applies only to the Glasgow and South Western route to Ardrossan, Largs and Fairlie, is that there are three trains more or less fast in each direction on Sundays. Although Ayr ranks also as a steamship port, no actual boat trains are operated, in that the pier is some way from the railway station, while there is so frequent a service of fast and express trains all day long that there is no particular need for special provision.

It is now necessary to include a few remarks as to the routes served by the respective services, but, before doing so, it may be explained that there are approximately four distinct divisions of traffic to be catered for. First, during the summer months there is a considerable amount of daily business travel between Clyde resorts and Paisley and Glasgow, involving inward journeys in the morning and return services in the late afternoon or early evening. Secondly, there is a large amount of week-end traffic requiring outward services on Friday afternoons or on Saturday afternoons, with provision for return on Monday mornings, frequently in time to commence business in Glasgow by about 10 a.m. Thirdly, there is an extensive day-trip traffic outwards from Glasgow in the morning, returning in the evening; and, fourthly, general holiday traffic involving both inwards and outward journeys on Saturdays. There is really a fifth class, as already indicated—that involved by the month-end traffic; but, except here and there, this does not show itself in the public time-tables, though it is a very important factor in the railway arrangements. As a rule, however, it is met by the scheduling of relief boats and

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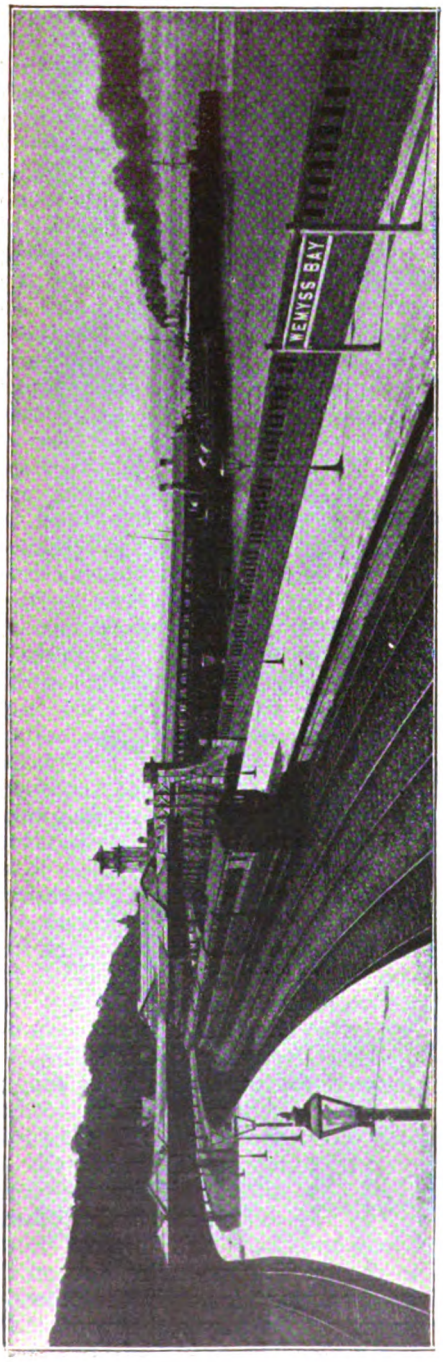
trains without public announcement, unless locally and as required.

Dealing first with the traffic from Clyde resorts into Glasgow, it may be pointed out that on each day in the week—of course, during the height of the summer—it is possible to leave Rothesay at 7.10 a.m. and be in Glasgow by 8.50 a.m., while the 8.5 a.m. gives a Glasgow arrival at 9.42 a.m. Similarly, Dunoon can be left at 7.50 a.m. or at 8.25 a.m., giving arrivals in Glasgow at 8.59 and 9.51 respectively, while there is quite a good service at 9.55, due in Glasgow (Central) at 11.27 a.m. In the opposite direction the 4.3 p.m. from St. Enoch delivers its passengers at Dunoon at 5.13, and the 4.30 p.m. from Glasgow (Central) enables Rothesay to be reached at 6 p.m. Rothesay passengers have other good services at 5.6 and 6.10 p.m., via Wemyss Bay, while Dunoon passengers have the benefit of the 5.20 and 6.45 trains from Glasgow (Central). These are the principal features of the services on mornings, other than Mondays, inwards, and, except Saturdays, outwards. On Monday mornings, to meet the requirements also of week-end traffic, the services are very much amplified, there being boats from Rothesay, via Wemyss Bay, at 6.45, 7.10 and 8.5 a.m., giving arrivals in Glasgow before 10 a.m., with similar services from Dunoon at 7.15, 7.35, 7.45, and 8.25. In the opposite direction the Saturday arrangements represent even more generous provision, in that they are associated with the special facilities necessarily required on a very large scale on Saturdays during the summer months.



WEMYSS BAY STATION AND PIER.

It must be remembered, also, that, while Rothesay and Dunoon have been specially mentioned, the services via Greenock or Gourock may serve also Kirn and Innellan, as well as Craigmore and Rothesay, while the Wemyss Bay steamers to and from Rothesay usually call at Craigmore, and sometimes at Innellan also. Boat connections are also involved at piers beyond Rothesay, towards the Kyles of Bute, and northward to Blairmore and Kilmun. Thus, it is possible to leave Kilmun at 7.10 a.m. and yet reach Glasgow at 9.3 a.m., or Kames at 7.10 a.m. (Ormidale on Mondays only at 6.40 a.m.), and be due in Glasgow (Central) at 9.42 a.m. There is, indeed, a connection on Mondays, by the Campbeltown and Glasgow Steam Packet Company's steamer, from Campbeltown and piers to Lochranza, reaching Glasgow at 10.25 a.m.

Similarly, the L.N.E. route provides a service, leaving Dunoon on Mondays only,

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reaching Glasgow at 8.8 a.m.; from Ardnadam at 7.15 a.m., due 8.56 a.m.; from Rothesay at 6.50 a.m. and Dunoon at 7.35 a.m., due 8.56 a.m.; and at 7.20 a.m. from Garelochhead. Corresponding express services from Glasgow (Queen Street) at 4.0, 5.8 and 6.5 p.m. provide for return journeys as required by holiday visitors needing to travel to and from business.

Correspondingly, on other routes, Kilchattan Bay, Millport and Keppel have two or three services giving arrivals in Glasgow before 10 a.m. every day in the week, there being on Mondays five services, beside several others not a great deal later. Outward facilities for this group of piers are provided from Glasgow (Central) at 4.30 and 5.6 p.m., and from St. Enoch at 5.20 and 5.25 p.m. To Arran piers there is a boat from Whiting Bay at 6.45 a.m., and another at 7.5 a.m. on Mondays, giving arrivals in Glasgow at 9.11 and 9.18 a.m., via Ardrossan, and outward services at 4.15 p.m. from Glasgow (Central) and 4.50 p.m. from St. Enoch. These services, by the way, also make connections with certain coach routes in Arran.

The remainder of our subject may best be covered by referring to the connections made at the respective piers, in that this course will enable various special points to be brought out as they arise. Dealing first with the outward services from Glasgow to Greenock, Gourock and Wemyss Bay, the 7.3 a.m. from Glasgow (Central) connects at Gourock with two boats, one for Kirn and Dunoon and the other—which actually comes from Greenock though not in connection with the train—for Strone, Ardnadam and Kilmun. The 7.40 a.m. from Central to Wemyss Bay serves Innellan, Craigmore and Rothesay, after which comes an interesting group of connections. A steamer leaving Princes pier at 8.45 a.m., after the arrival of the 7.30 a.m. from St. Enoch, connects at Gourock with the 8 a.m. from Central, thence serving Dunoon and Innellan. It then proceeds to Wemyss Bay, to connect with the 8.55 from Central before completing its journey to Craigmore and Rothesay. From Rothesay this trip, generally worked by the L.M.S. steamer *Jupiter*, is extended on Mondays, Tuesdays and Thursdays to Largs, Millport and Ayr, while on Wednesdays and Fridays, after calling at Largs and Millport, a tour is made round the islands of Bute and Cumbrae, through the Kyles of Bute and along Loch Ridden, Loch Striven, Loch Goil and Loch Long, this being one of the very popular Clyde excursions. As the latter part of the tour is among the northern reaches of the Firth, passengers from Largs and Millport change at Wemyss Bay to another steamer on the return journey. On the same days a cheap afternoon trip from Gourock to Loch Goil and Loch Long is arranged, passengers joining the *Jupiter* at Dunoon, when it calls on its way to the lochs mentioned in the course of the day tour. Connection is also made by the same group of trains with the turbine steamer *King Edward* (one of the best known private boats) on the Campbeltown route.

Next comes one of the most interesting of all the Clyde trips—that operated by the L.M.S. turbine steamer *Duchess of Argyll*. This has railway connections from St. Enoch at 8.5 a.m. to Princes pier, Central at 8 a.m. to Gourock, and Central at 9.30 a.m. to Wemyss Bay, while it is also served by the through train from Edinburgh (Princes Street) at 6.55 a.m. Leaving Princes pier at 8.50 a.m., calls are made at Gourock, Kirn, Dunoon, Largs, Wemyss Bay, Craigmore, Rothesay, and through the Kyles of Bute to Tighnabruaich. Thence the route is continued west of the island of Bute and down the east side of Arran, calling at certain piers to Whiting Bay. The return journey is made on a more direct route, via Garroch Head, Rothesay being reached at 4.25 p.m., Wemyss Bay at 5,0 p.m., Gourock at 5.50 p.m., and Greenock (Princes pier) at 6.5 p.m., enabling passengers to be back in Glasgow by 6.14 or 7.2 p.m., and Edinburgh at 8.12 p.m. This makes a tour which, allowing also for the remarkably cheap day fares in operation and the good restaurant catering facilities on board, is regarded as one of the most popular trips on the Clyde. The steamer *Duchess of Argyll* has come to be so closely associated with this trip—although occasionally it has to be taken off for special duties—that there are passengers who prefer to cancel their bookings if they find that another boat is on the service.

Space will not permit of lengthy descrip-

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tion of the wide facilities afforded throughout the day, but the following summary will afford an indication of their interesting and far-reaching character.. Unless specially mentioned, the services are given from each of the piers to which railway connections are indicated. Further, the steamers usually serve a number of piers beyond those actually mentioned, though the terminal is in all cases stated. Where separate boats are served by the same trains, this is shown by numerals (1), (2), &c.

Train from St. Enoch, via Princes pier.	Train from Central. via Gourock.	Train from Central. via Wemyss Bay.	
8.5	8.20	—	Turbine steamer *Queen Alexandra* to Tighnabruaich and Inveraray.
8.5	8.35	--	(1) MacBrayne steamer to Tighnabruaich and Ardrishaig. (2) Campbeltown and Glasgow Steam Packet Co.'s steamer to Campbeltown.
—	—	—	Between these and the next services an L.N.E. steamer for Craigendoran calls at Gourock at 10.35 a.m. for Blairmore, Lochgoilhead and Arochar.
9.24	9.50	--	(1) Dunoon, Rothesay and through Kyles of Bute to Kames and Ormidale. (2) From Greenock only to Kilcreggan, Blairmore and Kilmun. (3) MacBrayne steamer to Blairmore Lochgoilhead and Arrochar.
—	—	10.30	Craigmore and Rothesay.
—	10.40 SO	—	Dunoon and Rothesay.
--	11.6 SE	—	,, ,,
12.5	—	—	Williamson-Buchanan steamer to Dunoon and Rothesay.
--	12.50 SE	—	Blairmore and Kilmun.
—	—	1.10 SO	Craigmore and Rothesay.
--	1.20 SO	--	(1) Blairmore and Kilmun. (2) Dunoon.
1.45 SO	—	—	Dunoon, Rothesay and piers to Ormidale.
—	—	2.0 SE	Craigmore and Rothesay.
—	2.10 SE	--	Dunoon and Rothesay
—	—	2.30 SO	Craigmore and Rothesay.
—	2.40 SO	—	Dunoon and Rothesay.
2.40 SO	3.0	—	Williamson-Buchanan steamer to Dunoon and Rothesay.
(F.O.) 3.5	(F.O.) 4.0	—	Campbeltown and Glasgow Steam Packet Co.'s steamer to Campbeltown (Fridays only).
4.3	--	—	(1) Kilcreggan and Blairmore. (2) Dunoon and Rothesay (except Saturdays), calls at Wemyss Bay before going to Rothesay to connect with 5.6 p.m. from Central.
—	--	4.30 SE	Craigmore Rothesay. and piers to Kames.
—	—	5.6	Craigmore and Rothesay.
—	—	5.6 SO	Craigmore, Rothesay and piers to Kames and Ormidale.
—	5.20 E	—	(1) Kilcreggan and piers to Kilmun. (2) Dunoon and Rothesay.
—	—	6.10 SE	Innellan and Craigmore.
6.3	6.30	—	Evening cruise. Tuesdays, Wednesdays and Thursdays by turbine steamer as announced.
—	6.45	—	Dunoon, Strone, Ardnadam and Kilmun.
—	—	7.0 SO	Innellan, Craigmore and Rothesay.

In addition to the trips mentioned, there are special tours by L.M.S. steamer *Jupiter* or *Mercury* in connection with the 9.24 a.m. (daily) and 1.45 p.m. (S.O.) trains from St. Enoch and the 9.50 a.m. from Central, via Gourock, to the Kyles of Bute and Ormidale, while the steamers from Rothesay at 8.5 a.m., 10.40 a.m. (S.E.) and 1.30 p.m. (S.O.), via Wemyss Bay, provide for a popular tour—steamer via Largs and Millport to Kilchattan Bay,

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and coach thence to Rothesay. This trip can also be made from Wemyss Bay either way.

On Sundays the boat expresses from Central to Gourock serve steamers to Dunoon and the 11 a.m. to Dunoon and Rothesay. The *Duchess of Argyll* or the *Jupiter* is generally employed for the last-mentioned service, and on reaching Rothesay it makes a "Sunday afternoon cruise" round Bute and the Cumbraes to Fallen Rocks (Arran), via the Kyles of Bute, returning via Garroch Head to Lochranza (Arran), to Skate Island (Loch Fyne), or to Brodick Bay, as announced, the fares being very cheap indeed.

Bay and Rothesay apart from the Wemyss Bay services. The Ardrossan steamers usually ply to Brodick, Lamlash and Whiting Bay, in Arran. By the 10.10 a.m. service the new L.M.S. steamer *Glen Sannox* is booked to make afternoon cruises to Campbeltown Loch, Ayr, round Arran or round Ailsa Craig, as scheduled, while the *Atalanta* makes evening cruises as announced. The *Glen Sannox* is also utilised for evening cruises from Arran piers to Millport, round Arran, Rothesay, Ayr, Lochranza, Ardlamont Point (Kyles of Bute), round Ailsa Craig, round Cumbrae or round Lady Isle, while on certain days passengers from Arran can make afternoon

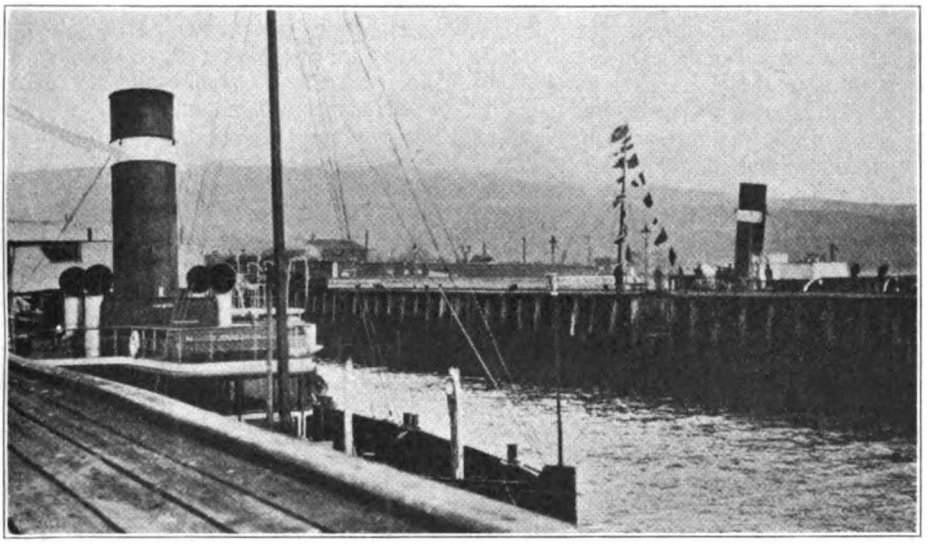

Photo.] **L.N.E.R. STEAMERS AT CRAIGENDORAN PIER.** [*J. F. Gairns.*

Return services need not be reviewed in similar detail, as they constitute a suitable distribution of the same facilities in the same direction. On Monday mornings, however, the boats arrive at the respective piers in rapid succession, and at periods in the day, and particularly on Saturday afternoons and evenings, Princes pier, Gourock and Wemyss Bay are busy places.

By comparison, Fairlie and Largs piers are comparatively quiet, while Ardrossan has only a fair number of boats, but a big traffic is operated during the summer months from Largs or Fairlie to Millport, with occasional services elsewhere, including calls by the Campbeltown steamers. Some of the boats also serve Kilchattan

cruises to Rothesay and back, outward by the *Duchess of Argyll*, returning by the *Glen Sannox*.

Obviously, a number of these various facilities apply to the regular runs of particular boats, thus obtaining new passengers in place of those disembarking, or utilising the steamers to full advantage, but that does not detract from the variety and interest of the different cruises and touring possibilities for which provision is made.

Via Craigendoran the services provided are more particularly those to routes along the more northern reaches of the Firth of Clyde, or to the favourite resorts of Dunoon and Rothesay and neighbourin

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piers. There are, however, as in the case of Greenock and Gourock, quite a number of instances where two or even more boats are booked to leave or arrive at Craigendoran pier simultaneously, and after allowance is made for the fact that the L.N.E.R. has to concentrate all its traffic at Craigendoran, while the L.M.S.R. has a number of railway piers, the former does its full share in meeting the requirements of Clyde traffic.

The train leaving Queen Street (Low Level) at 7.55 a.m. has three steamers in connection. One of them leaving at 9.0 a.m. goes first to Helensburgh, then serving Roseneath and Clynder; one at 8.50 a.m. to Dunoon, Innellan, Craigmore and Rothesay; while the third leaves at 8.55 a.m. and serves Kilcreggan, Kirn and Dunoon. The 9.20 a.m. from Glasgow has two boat connections, one for piers from Kilcreggan to Dunoon and Rothesay, and the other proceeding up Loch Goil. The boat goes across first to Gourock, Dunoon and Kirn, and then calls at Blairmore before going north to Ardentinny and Lochgoilhead. It then works round into Loch Long and on to Arrochar. This trip operates in conjunction with certain circular tours and road routes, in that from Lochgoilhead coaches go across to St. Catherine's, opposite Inveraray, while from Arrochar it is a short trip across to Tarbet, opposite Ben Lomond, and from whence the return journey can be made by Loch Lomond steamer and train from Balloch.

The 10.35 a.m. from Glasgow, which has quite a good connection from Edinburgh at 9.5 a.m., again serves two steamers, one up the Gareloch to Garelochhead, and the other to Dunoon and Rothesay. The 11.37 a.m. from Glasgow, in connection with the 10.5 a.m. from Edinburgh, provides another service to piers on the Dunoon and Rothesay route, the steamer continuing through the Kyles of Bute to Colintraive and Tighnabruaich. This trip does not run on Saturdays. At 1.10 p.m. daily a good service is given, *via* Craigendoran, to piers on the Dunoon and Rothesay route, while on Saturdays the 1.10 p.m. train also connects with the steamers to piers for Garelochhead. The 2.14 p.m. from Queen Street provides on Saturdays another Dunoon and Rothesay service, and every day the 4.0 p.m. connects with three steamers, one to Kilcreggan, Blairmore, Kilmun and Ardnadam, another to Dunoon and Rothesay, and the third to Gareloch piers. The 5.8 p.m. from Queen Street provides a Dunoon

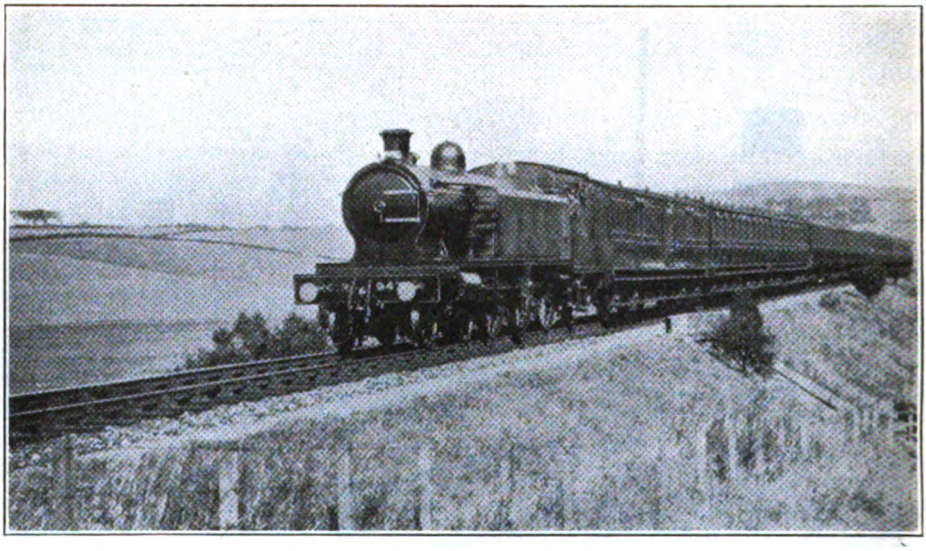

Photo.] [*C. J. L. Romanes.*

GLASGOW-WEMYSS BAY TRAIN AT RAVENSCRAIG, CALEDONIA.

4-6-2 Tank Engine No. 947.

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and Rothesay service, while the 6.5 p.m. (except Saturdays) serves Dunoon and piers to Kilmun and Ardnadam; on Saturdays there are two boats, one for Kilcreggan, Kilmun and Ardnadam, and the other for Dunoon and Rothesay. This service also connects every day with a steamer for Gareloch piers.

Besides the services mentioned, an L.N.E.R. steamer—usually the *Lucy Ashton*—makes trips across to Princes pier, Greenock, either as independent journeys or between other trips. This means that passengers from Craigendoran or from places such as Dumbarton, on the L.N.E.R. route from Glasgow, are enabled to join most of the steamers, whether railway or privately owned, which can be reached from Greenock, or, in one or two instances, Gourock. At Dunoon and Rothesay, too, connections can be made with both ordinary and special services serving the Firth of Clyde as a whole, so that, to all intents and purposes, the L.N.E.R. route provides a large proportion of the same facilities as are afforded by the services previously described.

There is no need to deal with the return facilities in the same detail, except to point out that there is a Monday morning service from Dunoon at 6.40, reaching Glasgow at 8.8 a.m., while steamers from Ardnadam and Kilmun, Rothesay and Dunoon, and from Garelochhead enable Glasgow to be reached every morning at 8.56 or 9.1 a.m. The return boat from Arrochar, corresponding to the trip of the 9.20 a.m. from Glasgow to Arrochar, returns at 2.10 p.m., while the except Saturdays trip from Tighnabruaich (in connection with the Inveraray steamer) is due back in Glasgow at 7.41 p.m. The last L.N.E. steamer is the 6.20 p.m. from Rothesay, due in Glasgow 8.51 p.m., with a boat and train an hour later on Saturdays.

It will, of course, be understood that while this article has been written on the basis of the full summer service of boats and steamers, particularly the arrangements operative in August, there are considerable variations during the early and later portions of the holiday period. Most of the standard facilities are retained, but until the need for the special trips commences and after the demand has dwindled, the facilities are naturally reduced, the situation in this respect corresponding with that of special summer railway services. Thus, quite a number of the steamers are announced to cease running at the end of August, while in September alternative arrangements frequently apply. The main point is, however, that, all the year round, there is a standard nucleus of steamboat facilities on all reaches of the Clyde for which there is a demand, and that these services are very greatly extended during the summer months, special attention being given to favourite day, afternoon and evening cruises, and to the exceptional pressure which unavoidably occurs on Saturdays.

A feature of all the Clyde steamers is the popular character of the meal and refreshment provision made, a necessity for the longer journeys and much valued even on the short trips. Breakfasts, luncheons and teas are served on a table d'hôte basis, with varied menus in both first and second-class saloons to suit different purses or desires; also light refreshments at very moderate rates, all charges being, by the way, announced in the booklets issued by the railway companies.

The following particulars may be added of the steamships engaged in operating these services:—

The Caledonian Steam Packet Co. Ltd. —*Duchess of Argyll* (turbine); *Duchess of Rothesay; Duchess of Fife; Marchioness of Breadalbane; Caledonia* (paddle). All these boats have a passenger capacity of more than 1,000, while the *Duchess of Argyll* is licensed to carry no fewer than 1,713.

L.M.S. (late G. & S.W. steamers).—*Glen Sannox* and *Atalanta* (turbine); *Glen Rosa, Juno, Jupiter* and *Mercury* (paddle). Here, also, passenger capacities range from 1,035 to 1,719 in the case of *Glen Sannox*, a new turbine steamer recently placed in service, replacing the old *Glen Sannox*, which for so many years constituted one of the most popular steamers on the Clyde.

L.N.E.—These are all paddle boats, very much, however, of the same type as those used by the Caledonian Steam Packet Company and the L.M.S.R., and also adapted to carry about 1,000 or more passengers. The boats used on the Firth of Clyde are the *Waverley, Kenilworth, Talisman, Dandie Dinmont* and *Lucy Ashton*.

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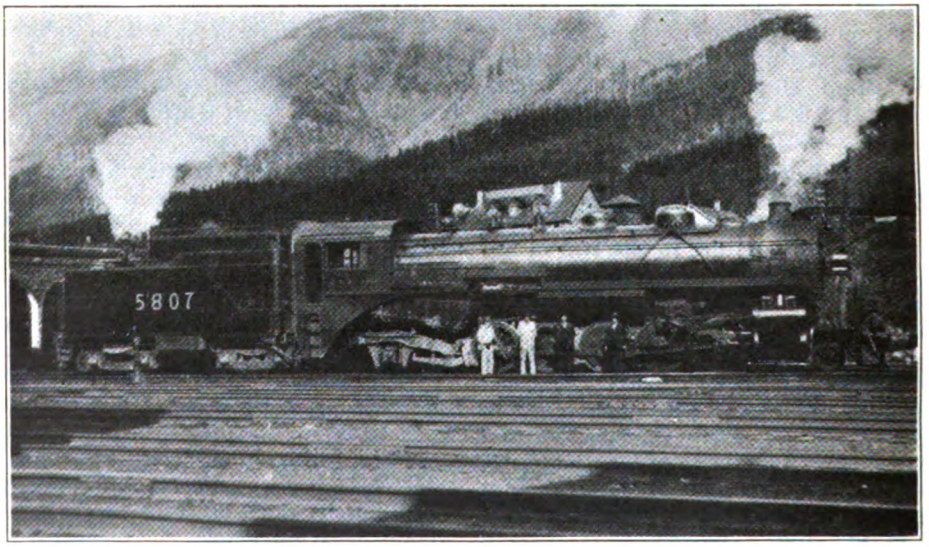
TRAFFIC OPERATION ON THE C.P.R.



We are indebted to Mr. C. R. Littlebury, of Calgary, Canada, for several interesting photographs taken on the Canadian Pacific Railway, two of which—somewhat unusual in character—are reproduced. One shows the westbound "Imperial Limited" express emerging from No. 2 spiral tunnel at Field Hill, and passing over the Kicking Horse River. Mr. Littlebury points out that, in the course of its "spiral" journey, the train earlier passed by the small house visible just above the engine tender, as the route involves a complete circle under Mount Ogden. The second view shows one of the 2-10-2 pusher locomotives used on the Field Hill section. The view is taken below Mount Dennis, which is seen in the background.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN,
M.Inst.T., A.I.Loco.E.

Photo.] [*W. M. D. Spelman.*

2.50 P.M. EUSTON TO MANCHESTER EXPRESS APPROACHING KILSBY TUNNEL.

CERTAIN remarks that I made in the November issue, when dealing with the most satisfactory methods of recording locomotive performance, have produced so interesting a letter from a former contributor of these articles—Mr. R. E. Charlewood—that I hasten to reproduce its contents. In regard to my preference to taking station passing times, rather than passing times at mile-posts, he writes: "My own case is, in some respects, similar to your own. I cannot always give undivided attention to timing, and found long ago that the mile-post method was less laborious, more valuable for comparative purposes than when only an abbreviated record of the running could be made, and on the whole less likely to admit errors. It does, of course, require familiarity with the road, but therein—in my view—lies its great advantage, for I have had so many records sent me in the past (from people who ought to have known far better!), whose station times were palpably absurd, and accompanied by that wealth of detail which invites error when compiled over a long space of time, that I encouraged all my correspondents to stick to mile-posts, or to some such fixed point on a station as a footbridge or a bookstall, as invariable points for the taking of times. The 'centre of station' timing, apart from adding to the figures recorded, introduces certain further difficulties if it can be taken variously on the up or down side of the line where the two platforms are not opposite—High Wycombe may be cited as a case in point—for then you may take a different timing point on each journey. But naturally a 'signal-box, junction or other strategic point' is just as good as a mile-post, from my point of view.

"The 'correction of logs according to the position occupied in the train' is, of course, equally applicable, if necessary at all, to any method of timing. If you leave King's Cross, for example, in the Hull or the Bradford portion of the 10.10 a.m. down, the Finsbury Park time will vary as between the one and the other, whether it be recorded to the 2½ mile-post, or to the top of the subway steps, or to a point midway between the two ends of the platforms. In my own case I do not use my mile-post timings to give me the actual distance travelled and time occupied from the starting-point, which actually they do not do, but rather as convenient marks to enable accurate station-to-station times to be obtained without a mass of figures. By way of illustration, there are those exact 3½-, 3½-, 3½-, 3-mile stretches from Watford to mile-post 31—the summit point

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of the 1 in 330—which, I cannot help thinking, are more valuable records, in a condensed log which does not give the speed of every individual mile, than the centres of the stations at King's Langley, Boxmoor, Berkhamsted and Tring. Darkness, of course, is and always must be fatal to the observer who does not know his road *well*. If he does know it, he will be able to time accurately to some, at least, of the mile-posts he has previously located, and to his agreed points at the stations.

"I admit, of course, that there are a great many stations where I do not time to mile-posts, but to a point on the station itself—probably the result of long usage or owing to the invisibility of adjacent posts. In some cases, too, I always take posts at both ends of stations where there are speed restrictions, or at a diverging junction of main lines where all the trains do not pass both posts. Where a mile-post series breaks off, I generally take the last of the old and the first of the new posts, which, incidentally—at such points as Westbury and Castle Cary—gives you a good comparative figure for the rate of speed over the junction."

Another letter on the same subject, from the pen of Mr. R. P. Angus-Lewis, is also worth quotation, ere I set out to reply to the points raised. "To refute your statement that mile-post timing requires a perfect acquaintance with the road traversed, I am sending you a couple of logs over the Great Eastern section of the L.N.E.R.; the only part of this with which I had any previous acquaintance was the suburban section as far as Ilford. Beyond this point I was only acquainted with the position of the 18th mile-post. As regards the up journey, I certainly had a detailed description of the route beforehand. As regards timing at night, I have done it many times from mile-posts on the Great Western, and to some extent on other lines, although I admit it is difficult matter on certain lines. As for correcting times for different positions in the trains, I generally give the approximate chainage of my coach at the start, or state my location in the train. Generally speaking, I travel as far forward as possible, though when trains reverse *en route*, as at Leeds (Wellington), this is not always convenient.

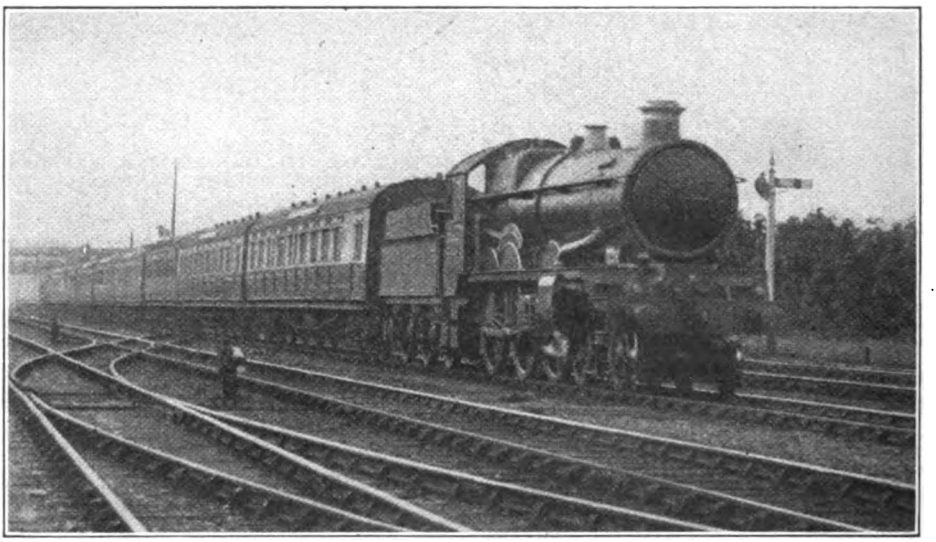

Photo.] UP ILFRACOMBE EXPRESS, G.W.R. [*M. W. Earley.*

4-6-0 locomotive No. 4078, "Pembroke Castle."

"As to the relative value of the ordinary watch and the stop-watch in mile-post readings, the ordinary watch has the advantage of giving continuous readings, so that there is frequent opportunity for detecting an error in any individual reading. The split-second chronograph is, of course, the ideal method, but few

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of us are fortunate enough to possess one. I find that, for speeds up to 60 m.p.h., the ordinary watch may be relied upon quite well for ½-mile timings, reading to ½-secs., though I usually take stop-watch readings on the alternate posts; that is to say, I time to miles and half-miles with the ordinary second-hand, and take the ¼'s and the ¾'s with the stop watch. Below about 36 m.p.h. I leave out the stop-watch, and time ¼-miles with the ordinary watch, if the stretch under observation is of sufficient importance.

"For night timing, a good idea would be to time to signal-boxes. These are well-lighted at night, whereas some of the stations are not, and the chainage can be found by referring to the adjacent mile-posts in the daytime. My objection to your five-second interval method is that it has no value in short distance timing, especially at high speeds. As an instance, a time of 3 min. 42 sec. between the G.N. 32 mile-post (north end of Hitchin) and the 37 (just before Arlesey), gives an average speed of just over 81 m.p.h. On the five-second and centre-of-station basis the corresponding time from Hitchin to Arlesey would be 3 min. 50 sec., which might be actually anything from 3 min. 46 sec. to 3 min. 54 sec.—a variation of 3 m.p.h. over what is a fairly long gap in a complete log. I quite realise that my methods would be impossible in your case, but I should have thought that you would have chosen definite points to time to at many stations, and have worked out their chainage at convenient opportunities. Station foot-bridges are very convenient on lines where they are clearly marked on each bridge."

With all respect to these two writers' the former of whom, in particular, has had an experience second to none in the record of locomotive performance, I see nothing sufficiently convincing in either letter to render advisable a change in the methods which I have followed for a considerable number of years. In the first place, I find no proof in the letter first quoted that timing from mile-posts requires less close attention than taking passing-times at stations. Personally I fail to see how it can possibly be so. The approach to a station is often advertised by the presence of "roaring," or slightly corrugated rails (as a result of frequent brake applications in the case of stopping trains), and is further verified,

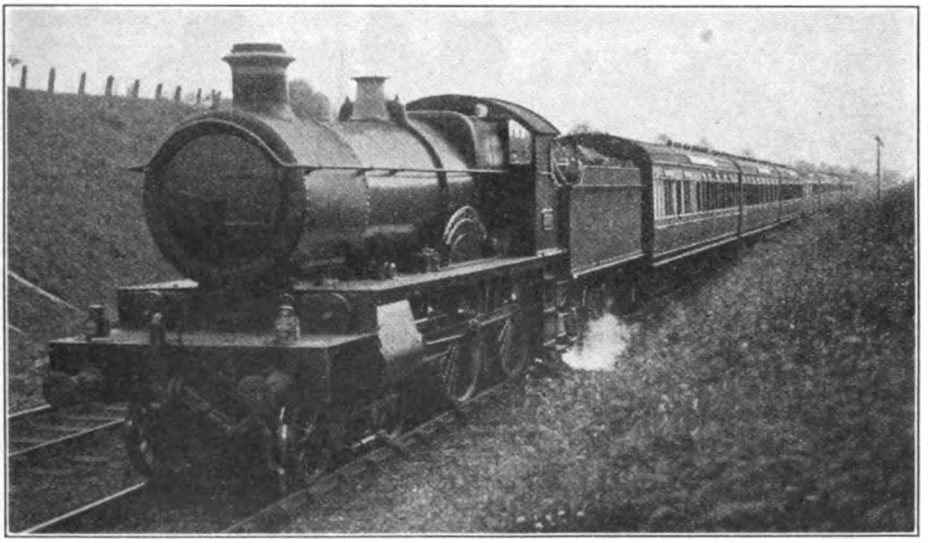

Photo.] [*H. G. W. Household.*

G.W.R. PENZANCE TO BIRMINGHAM AND WOLVERHAMPTON EXPRESS NEAR CHELTENHAM.

4-4-0 locomotive No. 3804, "County Dublin."

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in nine cases out of ten, by the presence of switches and crossings in the track. That is to say, to the ear of any traveller with a reasonable minimum of training in the work of recording, the evidence of the ear is added to that of the eye, which both prevents stations being missed in the daytime, when one is unable—through other occupations—to give undivided attention to the running, and still more so at night.

It seems to me impossible to conduct mile-post timing at all at night-time—except when the mile-posts are immediately under the carriage window, are perfectly clean, and are of the size installed by, say, the Midland Division of the L.M.S.—or apart from either a window-seat or a perpetual stance in the corridor. Yet, so far as I am concerned, even though I concede that a present total of some 650,000 miles of railway travel should tend to a measure of proficiency, I venture to claim that, without strained attention or fatigue—and despite the fact that I am almost invariably either reading, or, far more frequently, typing, as at the present moment on the 5.30 p.m. out of King's Cross—not one station in fifty, nor any material maximum or minimum speed, is missing from my log at the completion of any journey under detailed record.

Those who employ it habitually will, I think, agree that it is the five-second basis of timing that largely helps to eliminate the fatigue and the strained attention. The one-second basis makes it absolutely necessary to select mile-posts and other very definite points for timing purposes; the five-second basis compensates for the possibility of a slight misreading of the exact centre of a station, as the distances are also to the nearest one-tenth of a mile. In this connection I fail to see the force of my second correspondent's contention in regard to the times he quotes from Hitchin to Arlesey. My time of 3 min. 50 sec. for 5·2 miles between the centres of the stations—which, incidentally, would cover a margin of possible error between 3 min. 48 sec. and 3 min. 52 sec., and not between 3 min. 46 sec. and 3 min. 54 sec., as he claims—would give an average speed of 81·4 m.p.h., as against his average of 81·1 m.p.h., calculated from a time of 3 min. 42 sec. between the 32 and 37 mile-posts. This proves the perfectly reasonable accuracy of the five-second *plus*

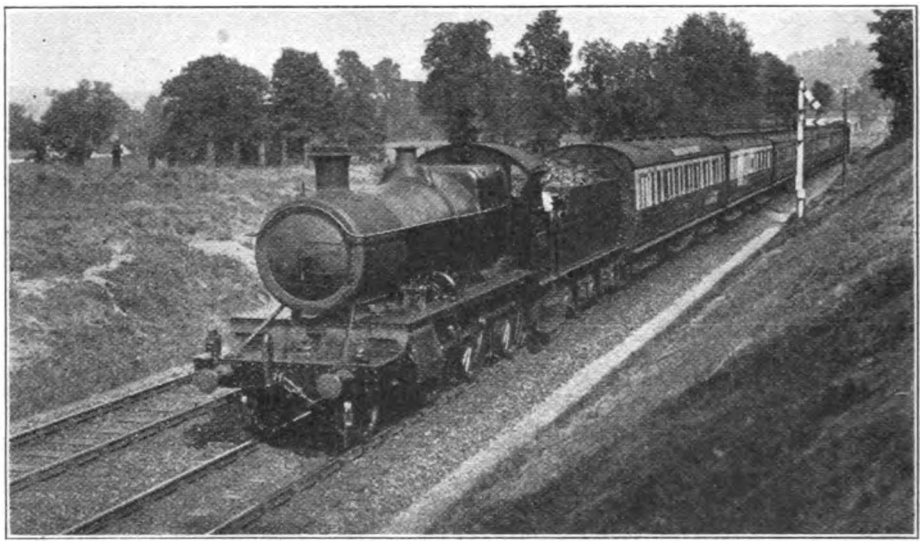

Photo.] [*H. G. W. Household.*

NEWCASTLE-SOUTH WALES RESTAURANT CAR EXPRESS NEAR CHARLTON KINGS, CHELTENHAM.

G.W.R. 2-6-0 No. 6335.

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one-tenth-mile basis of timing, rather than the reverse.

Apart from my own personal convenience, however, there is another consideration which would always weigh with me in regard to the continuance of my present method. Supposing I were to institute a system of timing to carefully selected mile-posts, signal-boxes, footbridges and bookstalls and other definite points at stations, and so on. These articles, whoever may be responsible for conducting them, are studied by a very wide circle of readers; the correspondence alone is adequate proof of that. Apart from those who travel frequently, many, if not most of those readers, when they make their journeys, enjoy the use of their watches in modest efforts at recording the work of the locomotives, and, I have little doubt, derive a good deal of pleasure from turning up the last previous account of running over that route, and comparing with it their own figures.

But supposing that, on those journeys, such questions have to arise as: "Let me see, now, is it the North or the South signal-box he takes here?"; "I'm sure I can't remember whether I ought to look out for the bookstall or the top of the subway steps at the next junction"—at seventy-five miles an hour, possibly—"How am I going to see any mile-posts in this pitch darkness?"; and so on. Timing in such circumstances tends to weariness rather than to recreation. And so, with all respect to my correspondents, as in my judgment the five-second and one-tenth-of-a-mile basis of timing provides for all reasonable accuracy, and as I am convinced that station passing times, *plus* certain important strategic points of other kinds intermediately, are the simplest to work to, even at the expense of meticulous accuracy, I see no valid reason for changing the method I have sought to standardise during some sixteen years of writing these articles.

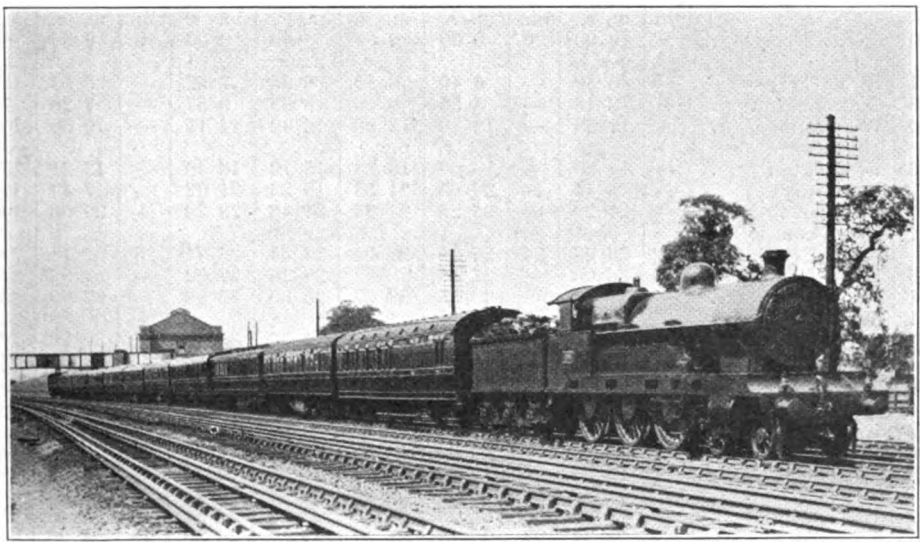

Photo.] [*F. E. Mackay.*

L.M.S. UP MANCHESTER EXPRESS PASSING KENTON.

My second correspondent has a word or two to say, also, on the matter of making up lost time, arising out of the contention of Lord Monkswell, in the recent House of Lords debate, as to the necessity for giving drivers precise instructions on this point. Criticisms in the newspapers of the idea, in many cases, "are not intelligent," he writes; "the Amiens derailment may have been due to this cause, but I am sure that the majority of accidents cannot be attributed to it." To go further, it would be of interest to know if any other recent accident, even abroad, could be attributed to recovery of lost time; and it is by no means proved that the Amiens

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disaster was so caused. "I think more stress," my friend continues, "might be laid on the matter of *definite* instructions to the drivers to make up time. To my mind, the slower-timed trains in particular should be given emergency schedules, to which they might be expected to conform when running late; especially should this apply to cross-country trains, which are usually the worst offenders in regard to punctuality, and on which so many connections depend. They are often booked at well below their possible speed, and yet drivers do not scruple to take their full booked times even when running late."

This vexed question has often been argued in these columns, and I need hardly add that I am personally all in favour of lost time recovery being officially encouraged. From the safety point of view, it has yet to be proved that the principle influences drivers to take undue risks; on the contrary, the return of a train from out-of-course to normal running, as soon as reasonably possible, makes for safety rather than danger; and from the economic point of view, that punctuality of running is fostered, which—probably more than any other consideration—attracts habitual travellers to one route more than another.

G.W.R., CHELTENHAM—BIRMINGHAM.

Distance.	Engine, 4-4-0, No.	Schedule.	3806	Schedule.	3812	3833	3800	3828	Schedule.	4140	4142
	Name ..		*County Kildare*		*County of Cardigan*	*County of Dorset*	*County of Middlesex*	*County of Hereford*		—	*Brisbane*
	Load (tons tare) ..		95		168	168	168	275		112	106
	" (" full) ..		100		175	175	175	295		115	110
Miles.		min.	m. s.	min.	m. s.	m. s.	m. s.	m. s.	min.	m. s.	m. s.
0·0	Cheltenham ..	0	0 00	0	0 00	0 00	0 00	0 00	0	0 00	0 00
			p.w.r.				p.w.r.				
4·1	Bishop's Cleeve ..	—	6 39	—	6 40	6 50	6 25	7 52	—	5 53	5 46
5·6	Gotherington ..	—	8 18	—	8 35	8 46	8 35	9 57	—	7 28	7 21
9·0	Winchcombe ..	—	11 50	—	12 30	12 38	12 42	14 15	—	10 50	10 48
					p.w.r.	p.w.r.					
11·6	Toddington ..	—	14 20	—	16 00	16 23	15 19	16 49	—	13 21	13 11
16·1	Broadway ..	—	18 44	—	20 55	21 53	19 23	21 02	—	17 43	17 02
18·8	Weston-sub-Edge	—	21 25	—	23 25	24 35	21 48	23 29	—	20 08	19 09
21·1	Honeybourne E. Jc.*	24	23 53	24	25 25	27 04	23 54	25 34	26	22 14	21 00
23·5	Long Marston ..	—	26 06	—	27 45	—	26 16	27 52	—	24 32	23 17
26·1	Milcote	—	28 12	—	29 55	32 27	28 35	30 08	—	27 00	25 43
29·1	Stratford-on-Avon	34	31 55	34	33 05	36 06	31 57	33 37	37	30 23	29 16
2·6	Wilmcote.. ..	—	5 00	—	5 35	5 59	4 51	5 23	—	5 07	4 31
4·3	Bearley N. Jc. ..	7	—	7	—	8 09	—	—	8	—	6 18
8·0	Henley-in-Arden	11	10 05	12	11 15	12 10	10 09	11 11	13	10 38	10 12
11·0	Danzey	—	—	—	14 35	—	—	14 40	—	—	—
12·8	Wood End Halt..	—	15 05	—	17 00	18 53	15 49	17 05	—	16 12	16 42
14·8	Earlswood Lakes	—	16 56	—	19 30	21 27	18 05	19 28	—	18 18	19 01
17·7	Shirley	21	19 29	—	22 20	24 29	20 54	22 34	22	21 08	22 42
20·2	Hall Green ..	—	21 39	—	24 25	26 46	23 08	24 54	—	23 40	25 19
21·7	Tyseley†	26	23 37	27	26 15	28 47	25 12	26 50	27	26 05	27 22
			Sig.stop		‡	‡	‡			Sigs.	‡
25·0	Birmingham ..	31	32 03	32	31 20	34 41	30 53	32 10	32	33 58	32 20
29·1	Net times (min.) C.-S.	34	31½	34	31½	33¾	31	33½	37	30½	29¼
25·0	Net times (min.) S.-B.	31	28⅛	32	31¼	34¾	31	32¼	32	31¼	32¼
54·1	Net times (total) ..	65	60	66	62¾	68½	62	65¾	69	61¾	61½

C.-S. = Cheltenham to Stratford. S.-B. = Stratford to Birmingham.
* Slight service slack. † Severe service slack.
‡ Slackened for cross-over road, Bordesley.

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Does time recovery lead to extravagant coal consumption? This difficulty can be got over by the long-established Continental principle of bonuses for both coal-saving and time-keeping, the two more or less balancing each other, and jointly encouraging more scientific footplate methods. Does time recovery, officially encouraged, tend to make drivers neglect speed restrictions? In my experience, the fastest general running is often marked by the most scrupulous observance of service slacks—over-scrupulous sometimes, with the result that what might have been record times are thereby spoiled, as these columns have more than once borne witness—whereas some of the most reckless running round curves that I have noted has taken place on poor runs over whose straight stretches time was being lost.

In this connection my correspondent asks: "Might I suggest that the higher speeds permissible in France over curves and junctions may be due to the use of speed indicators on the engines, which enable a considerable factor of safety to be dispensed with? The extent to which British speed restrictions are exceeded, with safety and no unreasonable discomfort in riding, seems to point to the fact that a certain saving in both time and fuel might be made by fitting our express engines with self-recording speed indicators as is done in France." This is a very interesting point; there is no doubt that most of our speed restrictions are framed materially on the safe side, seeing that the driver has no mechanical means of checking his speed. My friend notes, as examples of anomalies in the observance of British restrictions, recent speeds of 25 and 51 m.p.h. through High Wycombe (booked at 35 m.p.h.), and 37 and 60 m.p.h. over the east and west junctions at Honeybourne (booked at 40 m.p.h.); to these I might add the facing junction at Ashendon, scheduled at 45 m.p.h. in the Birmingham direction, and which I have negotiated at speeds varying from a very severe reduction to 40 m.p.h., to an unchecked speed of precisely 75 m.p.h.

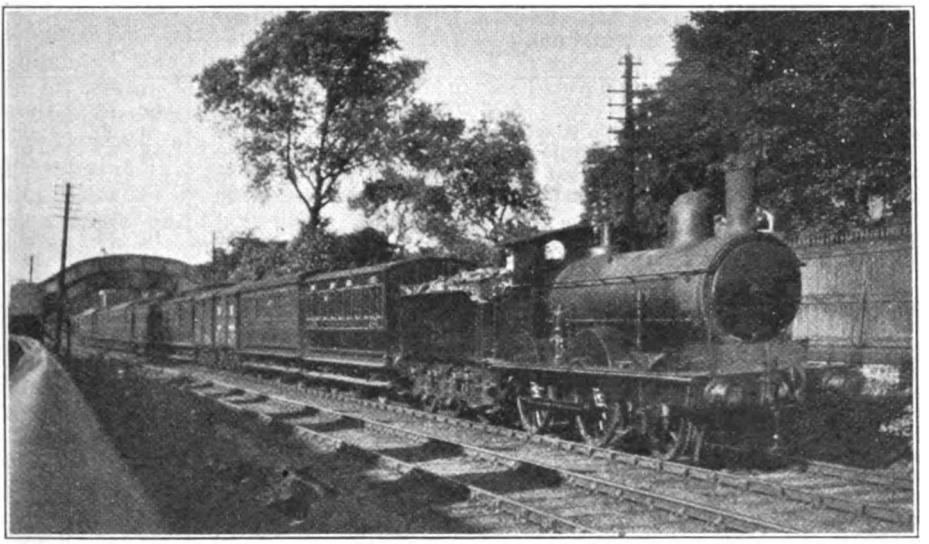

Photo.] **HULL-YORK TRAIN NEAR YORK, L.N.E.R.** [*J. F. Dearden.*

G.E. 2-4-0 locomotive No. 7483.

The correspondent whose letter has just been quoted sent with it a number of logs on the West of England trains of the Great Western between Bristol and Birmingham, which may now very suitably be dealt with, as they illustrate some of the points which have just been raised. Incidentally I notice that, despite his insistence on the desirability of mile-post timing with one-second observations, he gives his tare loads in a number of cases as "165 to 175 tons"—a percentage variation con-

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siderably greater than any that is likely to arise as a result of timing the centre of a station to the nearest five seconds! Incidentally one could hardly discover a route with greater terrors than this for the mile-post recorder. There is one series of posts from Birmingham to Tyseley; a second from there to Bearley North Junction; a third on to Honeybourne; a fourth from there to Malvern Road, Cheltenham; a fifth on to Lansdown Junction; and a sixth to Engine Shed Junction at Gloucester; a seventh from there to Standish Junction and an eighth to Yate; a ninth up to Westerleigh West Junction and a tenth to Filton; while another series to Lawrence Hill and a short stretch in to Temple Meads completes the round dozen!

This is a very hard route, with a ruling gradient of 1 in 150, occurring at certain locations in quite long stretches. The worst bank is probably the 9¼ miles descending from the summit at Earlswood Lakes past Henley-in-Arden; as far as Wood End halt (2 miles) it is at 1 in 183, but from there onwards 6¼ out of the ensuing 7¼ miles are at 1 in 150. The same gradient reappears for some 3 miles from Honeybourne West Junction, easing then to 1 in 200 up to Broadway; but there is a short fall at 1 in 264 before Toddington, ere the final rise is breasted to the 14½ mile-post, 2½ miles beyond Winchcombe, mostly at 1 in 150. From the summit down to Cheltenham the descent is mainly between 1 in 150–200, save for a brief 1 in 108, facing north-bound trains out of Malvern Road. There are no particularly severe grades between Cheltenham and Yate, the longest bank being the 7½ miles past Charfield and Wickwar, first at 1 in 357–311, and then for 5½ miles at 1 in 281. For the rest, there is a sharp rise at 1 in 134–140 from Yate up to Westerleigh, a fall at 1 in 300 from there to Filton, and the steep pitch of Ashley Hill bank, for 2 miles at 1 in 75. I should have commenced by noting that the rise from Tyseley to Earlswood Lakes is but moderate, the last 4 miles being at 1 in 528–183.

Severe slacks must usually be made to

G.W.R. BRISTOL-CHELTENHAM.

Schedule.	3812 206 215	Distance.	Engine, 4-4-0 No. .. Load (tons tare) .. ,, (tons full) ..	Distance.	Schedule.	3812 168 175	3800 168 175	3828 275 295
Min.	Min. sec.	Miles.		Miles.	Min.	Min. sec.	Min. sec.	Min. sec.
56	59 45	43·1	Stapleton Road ..	0·0	0	0 00	0 00	0 00
—	55 35	39·9	Filton Jc.*	3·2	—	7 30	8 07	9 26
49	54 05	38·8	Stoke Gifford W.* ..	4·3	10	8 55	—	—
43	48 40	34·2	Westerleigh W. Jc.*	8·9	15	16 00	16 40	17 49
	sigs.							sigs.
39	44 40	32·8	Yate*	10·3	19	18 45	19 14	22 36
—	39 50	28·0	Wickwar	15·1	—	24 35	24 05	29 08
—	37 58	26·1	Charfield	17·0	—	26 15	25 40	30 49
28†	31 55	20·9	Berkeley Road ..	22·2	30†	31 20	30 01	35 07
	sigs.							
—	28 20	18·5	Coaley	24·6	—	34 05	32 21	37 20
—	26 25	16·4	Frocester	26·7	—	36 30	34 23	39 14
—	24 30	14·6	Stonehouse	28·5	—	38 30	36 07	40 56
pass.	20 55							
19	18 35	13·0	Standish Jc.* ..	30·1	39	40 45	38 12	42 46
—	11 20	7·8	Tuffley Jc.	35·3	—	45 35	—	—
						sigs.	sigs.	
10	9 10	6·4	Chequers Road Jc.*	36·7	49	48 40	47 20	49 53
9	8 15	5·8	Engine Shed Jc.* ..	37·3	51	49 30	48 19	50 32
—	5 30	3·4	Churchdown	39·7	—	53 00	51 55	53 40
1	—	0·5	Lansdown Jc.* ..	42·6	59	56 45	55 24	57 34
0	0 00	0·0	Cheltenham	43·1	60	57 35	56 32	58 49
56	50	43·1	Net times (min.) ..	43·1	60	56½	54¾	55½

* Service slack. † Schedule is passing time at South Junction, 1·1 miles south of station.

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cross over from fast to relief lines near Bordesley (25 m.p.h.), through the junctions at Tyseley (15), the Engine Shed junction at Gloucester (20), Standish (35), Yate (15), Westerleigh and Filton (25), and a less severe reduction to 40 over the Honeybourne Junctions. A slight slack is also frequently made, in both directions, over the curve through Winchcombe Station. As nothing heavier than the 4-4-0 "Counties" is allowed to use the Midland main line from Standish to Yate, the haulage of some of the vast summer loads (which, unfortunately, I found no opportunity of timing) is no mean problem; but the trains throughout the rest of the year are very much lighter. For all that, such bookings as 30 min. over the 25 miles from Birmingham to Stratford-on-Avon, or, still more, 31 min. in the reverse direction; or, again, 33 min. over the 29·1 miles from Stratford to Cheltenham and 34 min. reversed, are remarkable in view of the intermediate hindrances cited. A certain latitude in timings, especially between Bristol and Cheltenham, where a good deal of dovetailing has to be carried out with the Midland service, is apparent in the schedules generally, owing to the necessity of fitting the trains into suitable paths.

Now, briefly, for the runs. In the main table from Cheltenham to Birmingham,

G.W.R., BIRMINGHAM–CHELTENHAM.

Distance.	Engine 4-4-0 No. ..	Schedule.	4147	3812
	,, name ..		*St. John's*	*County of Cardigan*
	Load (tons tare) ..		171	206
	,, (tons full) ..		180	215
Miles		Min.	m. s.	m. s.
0·0	Birmingham ..	0	0 00	0 00 sigs.
3·3	Tyseley*	5	5 56	7 10
4·8	Hall Green ..	—	8 35	10 00
7·3	Shirley	—	11 50	12 55
10·2	Earlswood Lakes ..	—	15 16	16 00
14·0	Danzey	—	19 03	19 25
17·0	Henley-in-Arden ..	20	21 48	21 55
20·7	Bearley N. Jc. ..	24	25 14	25 10
22·4	Wilmcote	—	27 00	26 50
25·0	Stratford-on-Avon	31	30 30	29 50
3·0	Milcote	—	4 44	4 50
5·6	Long Marston ..	—	7 32	7 30
8·0	Honeybourne E. Jc.*	10	10 07	10 05
8·5	Honeybourne W. Jc.*	11	—	10 40
10·3	Weston-sub-Edge ..	—	12 31	12 55
13·0	Broadway	—	15 19	16 20
17·5	Toddington ..	—	19 52	20 55
20·1	Winchcombe ..	—	22 26	23 30
23·5	Gotherington ..	—	25 51	27 05
25·0	Bishop's Cleeve ..	—	27 30	28 25
29·1	Cheltenham ..	35	†32 21	32 55

* Service slacks.

† Booked time on this run, 33 minutes.

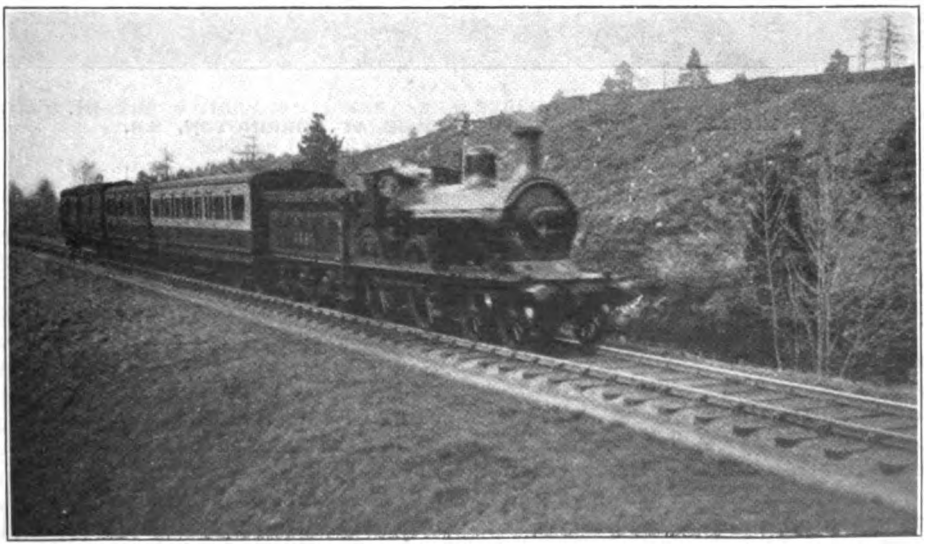

Photo.] ELGIN-ABERDEEN EXPRESS NEAR LONGMORN. [*W. Watt.*

G.N.S. type 4-4-0 locomotive No. 6883.

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wherein most of them appear, the only run of my own timing was that of *County of Cardigan*, in the second column. In the preceding column, with a very light train, some wonderful work was done by *County Kildare*, including a speed of between 54 and 56 m.p.h. up to Gotherington Summit, and a still more remarkable time of 11 min. 56 sec. up the 12·2 miles from Wilmcote to Earlswood Lakes, the *minimum* speed up the 1 in 150 being actually 57 m.p.h.! My run was not so notable for uphill speeds, 47 m.p.h. being maintained up the 1 in 150 in both Gotherington and Danzey banks, but there was some energetic downhill running, with maxima of 74 m.p.h. before Honeybourne, 72½ after the slack there and before Stratford, and 75 on the gentle descent between Earlswood Lakes and Tyseley.

County of Dorset did very poorly, chiefly owing to miserable downhill speeds, losing time on schedule with a light load; thereby two untabulated runs of my own were paralleled, *County of Brecon*, with 215 tons, taking 34 min. 45 sec., or 33 min. net to Stratford, and 34 min. 10 sec. to Birmingham, while *County of Middlesex*, with only 155 tons, took 34½ and 32 min. —after late starts of 12 and 10 min. respectively from Cheltenham. But the last-mentioned engine made some excellent running in the fourth column; speeds were 43 m.p.h. at Gotherington Summit, 71 and 68½ before and after Honeybourne, 68 at Wootton Wawen, 48½ on the 1 in 150 above Danzey, and 50 at Earlswood Summit, with 70 before Tyseley. Then comes *County of Hereford* with the 295-ton train; speeds were 41½ m.p.h. above Gotherington, 70 before and 72 after Honeybourne, with a slack only to 59 over the junctions, 64 at Bearley, 46 up the 1 in 150 and 48 at Earlswood and then 68 before Tyseley.

Of the two inside-cylinder "Flower" 4-4-0's, on the South Wales to Birmingham afternoon train, *Brisbane* made some startling running to Stratford, beating "even time" to Milcote, and No. 4140 did the best work on the second stage. *Brisbane* ran up to Gotherington Summit at from 56 to 57 m.p.h. all the way, touched 80 on the way down to Honeybourne, went over the junction at about 60 and re-attained 66 before Stratford; 4140's figures were a sustained 56½, 69, 60 (slack) and 66 m.p.h. Beyond Stratford the two engines both touched 65 m.p.h. at Bearley, and then fell to 51 (4140) and 42 (4142) on the 1 in 150, while the speeds before Tyseley were 64

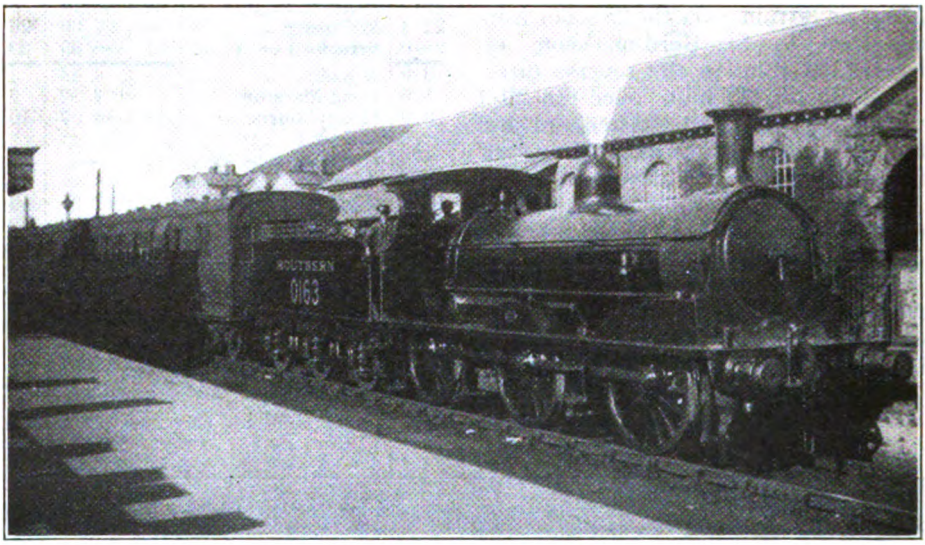

Photo.] [*A. Halls.*

REBUILT 0-6-0 LOCOMOTIVE No. 0163E AT TORRINGTON, S.R.

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and 68 m.p.h. Over 7 min. were gained by engines in the aggregate on both these runs.

In the west-bound direction, two runs only appear in tabular form. *St. John's*, another "Flower," slacked to 30 m.p.h. at Tyseley, accelerated to 51 at Earlswood Lakes, and maintained 68 to 70 m.p.h. down Henley bank, with frequent slacks. *County of Cardigan*, with a considerably heavier train, and a badly delayed start, gave us some magnificent running thereafter, working up from 46½ m.p.h. at Hall Green to 57½ at the summit, then descending to Bearley with speeds of from 71½ to 75 m.p.h., reduced by two slight checks and a third to 60 over Bearley Junction, after which 72½ m.p.h. was attained before the Stratford stop. *St. John's* made the better running after that, as, despite a slack to 50 m.p.h., at Honeybourne, the subsequent bank was breasted with no lower speed than 54 m.p.h., rising to 63 in the Broadway dip, and falling to 57½ at the summit; then followed a slow descent to Cheltenham. *County of Cardigan* touched 60 an hour before Honeybourne, slacked to 47 over the junction and did not rise above this speed up to Broadway, then attained 64, and despite a slack to 55 through Winchcombe, went over the summit at 53½, and finally attained 74 before slowing for Cheltenham.

The same engine did some brilliant work on to Bristol, in face of disheartening delays. We touched the mile-a-minute rate before Gloucester, then slacked to 30 an hour over Engine Shed Junction, and were next stopped by signal for over 3¼ min. at Standish. A fine start from there, with a sustained speed of 70½ m.p.h. at Coaley, was cut short by a signal check to walking pace through Berkeley Road. Nothing daunted, the driver rapidly accelerated to 62½ m.p.h., and maintained between that speed and 61 m.p.h., the whole way up Charfield bank; then signals all but stopped us again between Yate and Westerleigh. A final dash at 69 m.p.h. down to Stoke Gifford, 35 m.p.h. through Filton, and 61½ down Ashley Hill bank, brought us into Stapleton Road in only 3¾ min. over the time allowed, all delays inclusive. The net time from Cheltenham to Stapleton Road was probably not over 50 min., 6 min. gained on this length, added to 3 min. net from Birmingham to Stratford, and 2 min. thence to Cheltenham, making a total of 11 min. gain to engine on the journey. As an example of painstaking

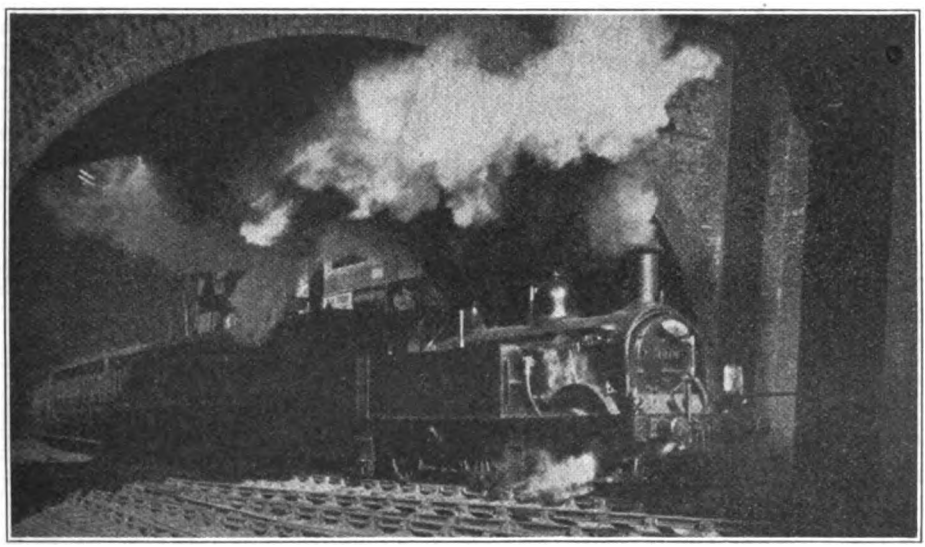

Photo.] [*A. L. P. Reavil.*

ON THE "WIDENED" LINES AT ALDERSGATE, METROPOLITAN RAILWAY.

Midland (L.M.S.) 0-4-4 tank engine on East Ham train.

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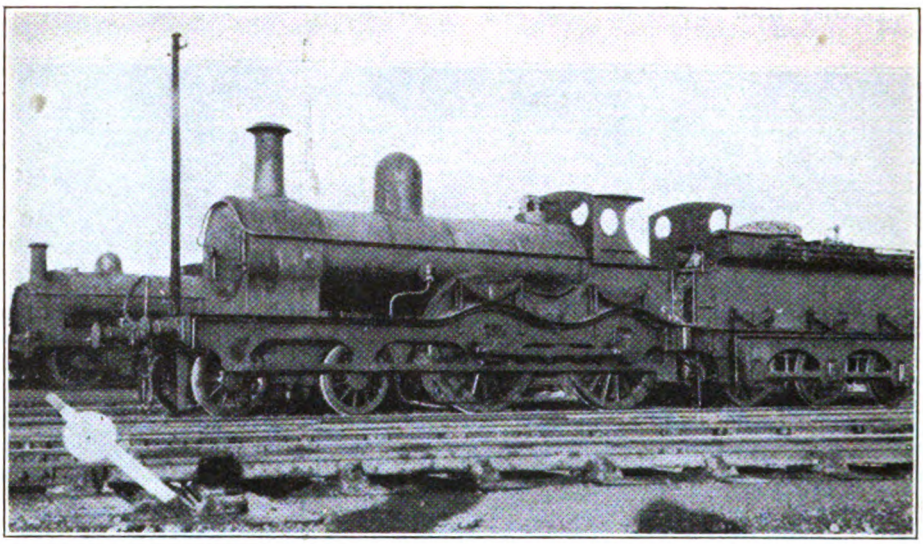
efforts to regain time lost by circumstances not under the driver's control, this run could hardly be bettered.

Brief mention will suffice for the remaining three journeys, from Bristol to Cheltenham. On my run (the first), No. 3812, *County of Cardigan*, having attained 28½ m.p.h. up the 1 in 75 to Filton, did feebly up the 1 in 300 from there, not exceeding 42½ m.p.h.; maximum down Charfield bank was 70½ m.p.h., but the rate fell away to the poor figure of 51 at Frocester. After Standish slack, we attained 64 m.p.h. before Gloucester, followed by signal checks. Two runs I had on the 7.48 p.m. out of Bristol were so mediocre, owing to the exceedingly liberal timing—the 19·8 miles from Yate to Standish are allowed 29 min.—as to be unworthy of record. Reverting to the third table, No. 3800 did work even inferior to that of the first-mentioned run, as far as Yate, but touched 72½ m.p.h. down Charfield bank, only fell to 58 at Frocester, and reached 62 before slowing to 28 over Standish Junction. Then came a maximum of 66 before the 33 m.p.h. slowing through Gloucester, after which a rate of 54½ m.p.h. was attained before Lansdown Junction.

Lastly, No. 3828, with a really heavy load, fell to 20 m.p.h. on Ashley Hill bank, worked up to 47 on the 1 in 300, got signals badly on before Yate, but touched 73 down Charfield bank, only fell to 61 at Frocester, and reattained 64 before slacking to 44 over Standish cross-over. Then came a speed of 64 an hour before Chequers Road Junction, a slack to 45, and a speed of 49 to 46 m.p.h. up to Lansdown Junction, time being gained, despite the check. From these descriptions, it is clear, however, that some of the most enterprising cross-country running in the country is being performed over this North to West main line of the Great Western; during the coming summer I must make a special effort to record the behaviour of the "Counties" with some of the vast holiday loads which appear to be taken over this route during the height of the season. I might also mention that considerations of space forbid me to deal at the present moment with a quantity of correspondence arising out of last month's article, but I shall hope to find opportunity in April.



OLD G.C. SACRÉ 4-4-0 LOCOMOTIVE No. 128B, AT GRIMSBY.

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NAMED LOCOMOTIVES, L.N.E.R.

By courtesy of the L.N.E.R., and in view of the many requests for information which have come from our readers, we have great pleasure in giving particulars of the names borne by L.N.E.R. locomotives of various classes, other than the "Director" class engines in use on the Great Central section, of which particulars were given in the January number.

4-6-2 Locomotives, Great Northern Section.

No.	Name.	No.	Name.
2543	*Melton*	2553	*Manna*
2544	*Lemberg*	2554	*Woolwinder*
2545	*Diamond Jubilee*	2555	*Centenary*
2546	*Donovan*	2556	*Ormonde*
2547	*Doncaster*	2557	*Blair Athol*
2548	*Galtee More*	2558	*Tracery*
2549	*Persimmon*	2559	*The Tetrarch*
2550	*Blink Bonny*	2560	*Pretty Polly*
2551	*Prince Palatine*	2561	*Minoru*
2552	*Sansovino*	2562	*Isinglass*
4470	*Great Northern*	4476	*Royal Lancer*
4471	*Sir Frederick Banbury*	4477	*Gay Crusader*
		4478	*Hermit*
4472	*Flying Scotsman*	4479	*Robert the Devil*
4473	*Solario*		
4474	*Victor Wild*	4480	*Enterprise*
4475	*Flying Fox*	4481	*St. Simon*

4-6-2 Locomotives, North Eastern Area.

No.	Name.	No.	Name.
2568	*Sceptre*	2576	*The White Knight*
2569	*Gladiateur*		
2570	*Tranquil*	2577	*Night Hawk*
2571	*Sunstar*	2578	*Bayardo*
2572	*St. Gatien*	2579	*Dick Turpin*
2573	*Harvester*	2580	*Shotover*
2574	*St. Frusquin*	2581	*Neil Gow*
2575	*Galopin*	2582	*Sir Hugo*
2400	*City of Newcastle*	2403	*City of Durham*
2401	*City of Kingston-upon-Hull*	2404	*City of Ripon*
2402	*City of York*		

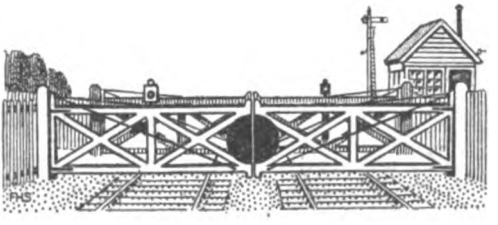
4-6-2 Locomotives, Scottish Area.

No.	Name.	No.	Name.
2563	*William Whitelaw*	2565	*Merry Hampton*
2564	*Knight of the Thistle*	2566	*Ladas*—to be fixed on
		2567	*Sir Visto*

"Director" Class Locomotives, Scottish Area.

No.	Name.	No.	Name.
6378	*Baille Macwheeble*	6390	*Hobbie Elliott*
6379	*Baron of Bradwardine*	6391	*Wizard of the Moor*
6380	*Evan Dhu*	6392	*Malcom Graeme*
6381	*Flora MacIvor*		
6382	*Colonel Gardiner*	6393	*The Fiery Cross*
6383	*Jonathan Oldbuck*	6394	*Lord James of Douglas*
6384	*Edie Ochiltree*		
6385	*Luckie Mucklebackit*	6395	*Ellen Douglas*
		6396	*Maid of Lorn*
6386	*Lord Glenallan*	6397	*The Lady of the Lake*
6387	*Lucy Ashton*—to be fixed on	6398	*Laird of Balmawhapple*
6388	*Captain Craigengelt*—to be fixed on	6399	*Allan-Bane*
6389	*Hayston of Bucklaw*	6400	*Roderick Dhu*
		6401	*James Fitzjames*

In addition, No. 8900, *Claud Hamilton*, Great Eastern section, may be mentioned.



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Locomotive and Train Working in the latter part of the 19th Century.

THE DUBLIN, WICKLOW & WEXFORD RAILWAY.—No. II.

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

THE oldest 2-4-0 tender engines, Nos. 12 to 14, had been built in 1860 by W. Fairbairn and Sons, and were the only engines on the line which, as far as I remember, had double frames and outside cranks. The coupled wheels were 5 ft. 6 in. diameter and the cylinders 14 in. by 22 in. The engines were rebuilt at Grand Canal Street in 1880-1, when the cylinders were enlarged to 15 in. diameter. Originally they had been used on the main line trains between Harcourt Street and Wicklow, and later to Wexford, but were subsequently replaced by inside framed 2-4-0 engines built in 1864 and 1873 by Sharp, Stewart and Co. These were Nos. 24 to 26 and 32 to 33, and had 5 ft. 3 in. coupled wheels and 15 in. by 22 in. cylinders. Though of small size they were considered as main line "express" engines. From 1886 onwards they were rebuilt with 5 ft. 6 in. wheels and 16 in. by 24 in. cylinders, after which they continued to work the most important main line trains until the appearance of much more powerful 4-4-0 engines in 1895. The goods engines until 1891 were all of the 0-4-2 mixed traffic type by Sharp, Stewart and Co., of which two or three had 5 ft. coupled wheels and 16 in. by 24 in. cylinders. The latter were used chiefly on mixed trains, the more powerful engines with 4 ft. 9 in. wheels and 17 in. by 24 in. being employed principally on the main line goods service.

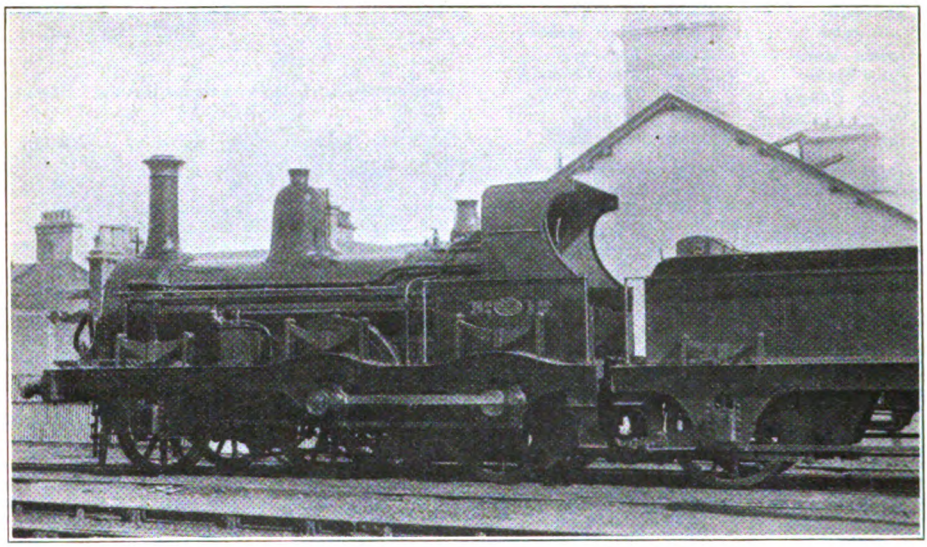

Photo.] **2-4-0 PASSENGER ENGINE No. 12.** [*Loco. Publishing Co., Ltd.*

Built by Fairbairn & Co. in 1860. Rebuilt 1880 by D.W. & W.R.
Coupled wheels, 5 ft. 6 in. diam. Cylinders 15 in. by 22 in.

The main line "express" trains during the 'eighties had much in common with the proverbial snakes in Ireland; their speed was about the same, and there were none. To find out the habits and customs of these ophidians it was necessary to wend one's way to Harcourt Street station, whence they started their glide as far as

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Bray, after which they continued to wriggle southwards. This is somewhat of an exaggeration, in that the best train, the 5.10 p.m. from Dublin, started its wriggle not at Bray but at Shankhill. The fastest run on the whole line was performed by this train, which covered the Dublin-Shankhill stretch, 9¾ miles, in 20 minutes; speed 29¼ m.p.h. In this way it served as an excellent suburban express for business people living at Bray. What happened to it after leaving the latter station I do not know, but all main line trains stopped everywhere, as well as at a lot of other places, on their way to Wexford. Even the down morning mail, which had a Kingstown connection, did likewise. The three up expresses went through similar experiences between Wexford and Bray, from where all of them made a dash for Harcourt Street, 12¼ miles, in 30 minutes, at the nominal time-table rate of 24½ m.p.h., though I think they put in two minutes or so at a ticket platform.

But the chief and most interesting train services were the locals from Dublin to Kingstown and Bray. In respect of these services the Dublin, Wicklow and Wexford differed completely from the other principal lines which had their termini in Dublin, since the latter had little or no suburban traffic except, perhaps, that given by the Great Northern between Amiens Street station and Howth. Moreover, their stations were frequently almost deserted except when main line trains were about to leave or arrive. There were two distinct and frequent local services between Dublin and Bray, of which one was worked from and to Harcourt Street station *via* Dundrum, over the inland or main line. At one time these trains were worked by 2-2-2 tank engines, but the latter had been superseded by the 2-4-0 tank engines, which were employed almost exclusively, and but few of the former class were to be seen at Harcourt Street. An old 2-4-0 tank engine, generally No. 8, acted as shunting pilot at this station.

On the coast route from Westland Row station to Kingstown and Bray the trains were lighter, though more frequent. The 2-2-2 tank engines were used in nearly all cases, and within my own recollection hardly any 2-4-0 tank engines appeared to work between Kingstown and Dublin.

A feature of the time-tables was the excellent Sunday services to Kingstown and Bray; there were quite as many trains on Sundays as on weekdays from Westland Row, if not more, in addition to a very good service from Harcourt Street.

Fortunately, although O'Rourke had objections to engine-sheds, since they savoured too much of "shop," he was much more amenable when railway stations were concerned, and, as he generally found something in them to interest him, he was nothing loth to come and assist me with his guardianship and sympathetic advice, the latter thrown in when he thought that the situation demanded it. I soon discovered that one of the chief attractions lay in the train guards, all of whom at every station he appeared to know well. I also found out later that politics had much to do with this, and that an Irish league of some sort or other, the nature of which was not divulged to me, was one of the bonds which connected him with the railwaymen who travelled about the country. "It's a misguided old Tory ye are," was all I could then get out of him in reply to a chaffing remark which I threw out on the subject.

At about half-past six one evening O'Rourke and I found ourselves at Westland Row station, our destination being Kingstown. Shortly before the train left, a dapper, well-dressed man of middle age with a rubicund countenance came up the platform. His appearance was productive of a subdued chuckle on the part of O'Rourke, who remarked in a mysterious undertone that I was well on the road to see "one of the sights." The newcomer came up and nodded beamingly to my friend, who thereupon introduced me to a Mr. D——. The first noticeable thing about the latter was an exceedingly squeaky-voiced cheerfulness, which gradually faded into a dull sleepiness. It was evident that he had had some refreshment, but was, as O'Rourke afterwards expressed it, "moderately sober," whatever that was intended to mean. We followed him into a first-class compartment, where he immediately dozed off in the near corner. At Blackrock a porter made straight for the carriage, opened the door, and shouted the exhortation: "Misther D——, it's at Blackrock ye are, an' ye must get out now," whereupon the

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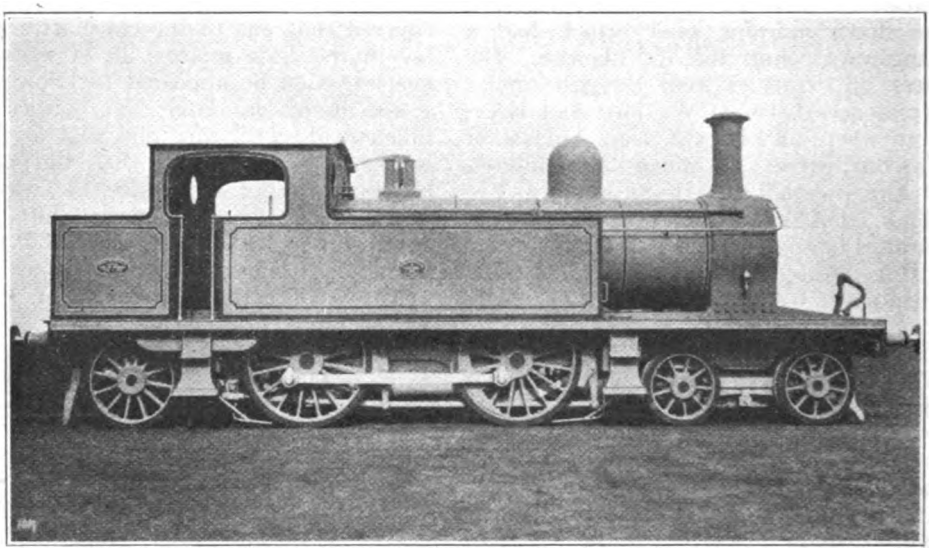
sleepy one in part got out and was in part helped out on to the platform, straightened up, and sent on his way. After his departure O'Rourke told me the following story: D—— was a bachelor and something at a Dublin bank, of the premises of which he daily shook the dust from his feet at about 4.30 p.m. by the clock, proceeding straightway to his club, where he remained for about two hours before taking the train home. His habits, customs, and time-table had become stereotyped; he always went by the same train and, except upon one celebrated occasion, had never been known to travel on to Killiney." "Arrah now! Misther D——," said the unbelieving porter persuasively but firmly, "ye know ye've got to get out, and phwat will your sister be sayin' av ye don't go home?" "But I assure you, 'pon my honour," said the squeaky voice, "it's perfectly correct; I'm going to a picnic at Killiney." The porter was obdurate, and, after further persuasive efforts, called up the guard: "Here's Misther D—— on the wrong train, an' he says he's goin' to a picnic at Killiney." "Picnic!" retorted the guard with emphasis, "it's a foine picnic he'll be goin' to, an' we kaping the train all



4-4-2 TANK ENGINE (SERIES Nos. 52-54).

Built by Sharp, Stewart & Co., Ltd., in 1893.
Coupled wheels 5 ft. 3 in. diam. Cylinders 18 in. by 26 in.

by any other. The exception in question had occurred one afternoon a year or two previously, when he omitted the club and put in an appearance at Westland Row station at about 4.30 p.m. dressed in immaculate garb, additional adornment being provided by a large white rose in his button-hole. This time he does not seem to have gone to sleep, and at Blackrock the astonished porter caught sight of him as the train came in; but the latter did not lose his presence of mind, for the carriage door was duly opened, the name of the station announced, and the occupant duly exhorted to alight. "Oh! it's all right," said the passenger, "but I'm going this blessed time. Shure! Misther D——, ye'll have to come out." At this point the unfortunate passenger for Killiney was firmly grabbed by the two guardian angels and hustled unceremoniously on to the platform, expostulating loudly the while that a grievous mistake was being made. "Now ye're all right," the porter added soothingly; "it's good luck for ye that we looked afther ye so nicely." "But surely he went on by the next train," I ventured to add at the end of O'Rourke's recital. "No, he didn't; he went home, and when he didn't turn up at the picnic my brother and some friends who were there made inquiries, and heard all about

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it from two or three men who were in the train, and afterwards I pumped the guard. Faith! I tell you, all Dublin was laughing for days."

Kingstown station had its peculiarities. Most of the local trains to and from Westland Row arrived at and departed from a bay-platform on the east side, which, I believe, was the original terminus of the old Dublin and Kingstown Railway. Through trains to and from Bray, and also trains to and from the Pier station, used a single main line platform on the west side, the through line being single through the station. But in those days I do not think any through main-line trains ran via Kingstown and Dalkey, and passengers had to change at Bray into the trains from Harcourt Street. Harcourt Street station was another example of the Irish fondness for a single platform, and was somewhat after the manner of an egg which was all shell and no yolk. It was very magnificent outside until you got to the inside.

My second visit to Ireland occurred several years afterwards, and a good many changes had taken place in the meantime. O'Rourke, I regret to say, had joined the great majority, and consequently, the Dublin, Wicklow and Wexford Railway took on for me a somewhat more sombre hue. The principal alterations were produced by the reconstructions of Westland Row station, and the through line which extended northwards from it to Amiens Street station. The morning mail train to Dublin now ran through from Kingstown Pier via Amiens Street round the north of Dublin to the Great Southern and Western station at Kingsbridge, the mail vans and carriages then forming a portion of the through express to Cork and Queenstown. There was also a through carriage from Kingstown Pier to Belfast which was transferred at Amiens Street to the Great Northern Railway. The evening train from the Pier had similar through connections. The Midland Great Western terminus at Broadstone, being awkwardly situated in regard to connecting lines, the Postmaster-General magnanimously sanctioned the attachment of a carriage to the train conveying the mails to Westland Row for the special use of passengers who wished to cross Dublin in a hurry to catch the Galway mail train.

The through mail trains between Kingstown Pier and Kingsbridge were worked to and from the latter station by three new 4-4-2 side tank engines, Nos. 52, 53 and 54, built by Sharp, Stewart & Co. in 1893. These were much larger engines than the Dublin, Wicklow & Wexford Railway had hitherto possessed. The cylinders were 18 in. by 26 in., coupled wheels 5 ft. 3 in., bogie wheels 3 ft. 1½ in. and trailing radial wheels 3 ft. 9 in. diameter. The water capacity was 1,400 gallons and the total weight of engine in working order, 55 tons.

Another effect of the opening of the connecting railway was the occasional appearance at Amiens Street of tender engines. The double-framed 2-4-0 engine, No. 12, was often in evidence there, and seems to have come through from Bray. But the coast line locals, as before, were generally worked by the 2-2-2 tank engines, and the 2-4-0 type usually remained on the Harcourt Street trains.

The main line trains had in 1891 been accelerated between Harcourt Street and Bray, the morning train, which took on the Kingstown mails at the latter station, now running from Harcourt Street to Bray, 12¼ miles, in 22 minutes, but the 2.0 p.m. and 6.0 p.m. main line fasts required 24 minutes each. The up trains now stopped at Milltown, the fastest taking 20 minutes for the 10½ miles from Bray. Southwards from Bray matters were pretty much as they had always been and all trains stopped everywhere.

The later 2-4-0 side tank engines, built by the Company between 1892 and 1896, were Nos. 1, 6, 7, and 10, and had a more modern appearance than the engines of the early 'eighties. The coupled wheels had a diameter of 5 ft. 5 in. and the cylinders were 16 in. by 24 in.

Two heavy six-wheels coupled goods engines, Nos. 50 and 51, were built by the Vulcan Foundry in 1891, with 5 ft. wheels and 18 in. by 26 in. cylinders. These were the only 0-6-0 engines on the line, until Nos. 17 and 36 were built at Grand Canal Street works in 1899 and 1900 respectively. But the last-mentioned engines were not so large, the cylinders being only 17 in. by 24 in.

In 1895, four 4-4-0 heavy passenger engines, Nos. 55 to 58, were built by the Vulcan Foundry. These were of quite a modern type, with 6 ft. coupled wheels

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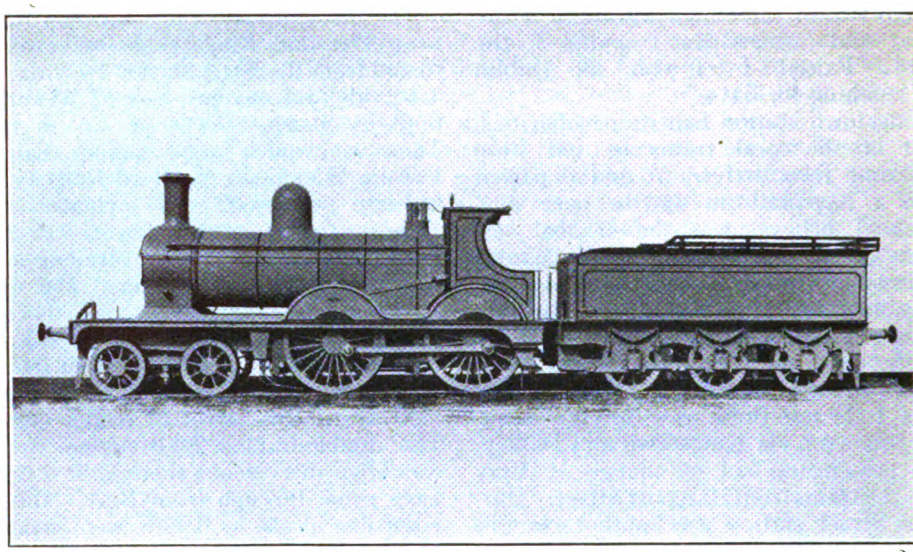

4-4-0 LOCOMOTIVE No. 56.

Built by Vulcan Foundry Ltd., in 1895. Coupled wheels 6 ft. diam. Cylinders 18 in. by 26 in.

and 18 in. by 26 in. cylinders. The boiler, which carried 150 lb. pressure, had a total heating surface of 1,027 sq. ft., with a grate area of 19·68 sq. ft. The weight of the engines was about 40½ tons in working order. The tenders were also of modern design with springs outside the frames and beneath the platforms, and had a water capacity of 2,000 gallons. Like the Vulcan goods engines and the large 4-4-2 tank engines, they had round-topped domes, and the safety valves above the firebox casing were of the Ramsbottom type. They superseded the old 2-4-0 engines on the main line trains between Dublin and Wexford.

In 1897, two 0-6-2 goods tank engines, with 4 ft. 6 in. coupled wheels, and 18½ in. by 26 in. cylinders, were built by Kitson & Co., of Leeds. For what special service these engines were intended I do not know, but in 1908 they were converted to 0-6-0 tender engines for main-line work.

The colour of the D. W. & W. engines during the last century was medium green with black bands and yellow lines. In the early days of the Dublin & Kingstown Railway the engines had names only, but the last of these disappeared during the 'seventies, after which there were no named engines for many years. But during the present century until the War, nearly all engines, except a few of those used for goods traffic, were named.

The most important alteration in the main line passenger service concerned the down morning and up evening main line mail trains, though whether this was a product of the end of last century, or of the early part of the present century, I do not know. The new arrangement was for the down mail to start from Westland Row, instead of Harcourt Street station, and pick up the mails at Kingstown. Several intermediate stations were omitted, and eventually a through run from Bray to Wicklow appeared in the time-table. I am open to correction, but I think that some of these improvements came about shortly after the line to Waterford was opened in 1904.

I have received some interesting notes from a gentleman in County Dublin, whose earliest recollections of the D.W.W.R. dated back to about 1872 or 1873. Practically all the passenger traffic to Kingstown and Bray was worked by the 2–2–2 tank engines. Of these most of the work was performed by six named engines without numbers, the *Oberon*, *Titania*, *Ariel*, *Kelpie*, *Banshee* and *Kate Kearney*. These had straight weather boards, and were painted green with a good deal of brass about them. The chimneys had copper

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tops. Later on they were painted an ugly red and had stove-pipe chimneys and cabs. The boiler of the *Banshee* burst in Bray station, the driver and fireman being killed. The above engines were by Neilson and Company in 1865. There were also two 2-2-2 tank engines, Nos. 27 and 28, with outside cylinders, slightly inclined, and with brass domes close to the chimney, together with a few extraordinary little machines which must have been on their last legs in the early 'seventies. Two were named *Jupiter* and *Juno*, and had, I think, outside cylinders, a very low pitched boiler with a safety valve column instead of a dome, and a sort of haystack firebox and no weather board of any sort.

The rolling stock in the 'seventies was practically all four-wheeled, and some of it, I always heard, originally belonged to the old Kingston-Dalkey atmospheric railway, or possibly to the old 4 ft. 8½ in. gauge, as the carriages were narrow and the footboards wide, about 16 inches or so. There were a lot of open carriages, which were used in the summer; one was shown in the last Dublin exhibition. These had wide footboards.

Westland Row, then a terminus, was a dingy, dirty shed with one platform, a turntable at the end and a run-round road, so that the engine, which brought in the train could turn and get to the other end. The new Westland Row station has now two through lines and three bays, but when built, the loop-line to Amiens Street had not been made. When they started to make this it was found that the proposed centre lines were 18 in. too low to carry the line across Westland Row, and consequently these had to be raised and the platforms slanted up.

The rails, as I first remember them, were of the iron Vignoles pattern, very light and were replaced by steel rails, which could be turned over. There were no automatic brakes or block signalling, and I have often seen three trains on the same line following one another cautiously by sight.

SHUNTING AT BRAY, GREAT SOUTHERN RAILWAYS, IRELAND.

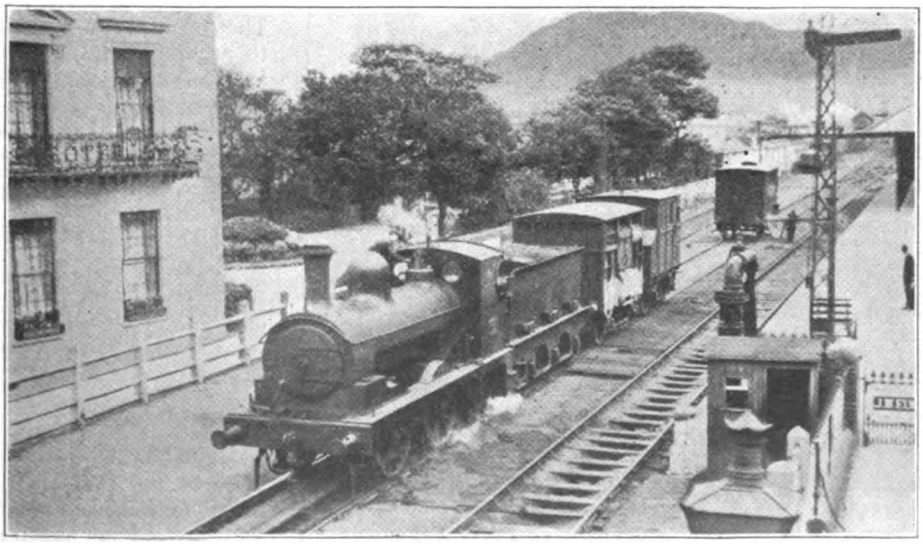

Photo.] D. & S.E. 0-4-2 ENGINE No. 39, "SUIR." [*H. H. Coghlan.*

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Walking over the Forth Bridge.

By J. KINGSLEY BELL.

APPROXIMATELY two hundred trains cross the Forth Bridge every twenty-four hours. But as most of these trains travel at the bridge's speed limit of forty miles an hour, passengers obtain only a blurred impression of the massive structure over which they are passing. They seem to be travelling through a maze of towering columns and intervening lattice-work, which suggests to their minds an intertwining forest of steel.

Very different is the impression received when walking over the bridge. Then its characteristics stand out clearly and can be studied at leisure. One of the first of these to attract attention on stepping on to the bridge is its permanent way.

Instead of ordinary rails, secured in chairs spiked to transverse sleepers, flat-bottomed rails, screwed down to longitudinal oak waybeams contained in four parallel steel troughs, form the double line across the bridge.

These troughs and their disposition constitute the salient feature of the Forth Bridge permanent way. It was adopted to prevent a train, on being derailed. dashing into one of the two main girders of the bridge, demolishing it, and, consequently, possibly causing the collapse of the bridge as a whole.

To obviate this possibility, not only are all four rails enclosed in steel troughs, the sides of which act as a double guard-rail, but each of the two outermost troughs is based directly on the top of one of the main girders. The result is—as is apparent to anyone walking over the bridge—that should a derailment occur, the train would in all probability run along on the waybeams inside the troughs, and that should it succeed in breaking down the sides of the troughs, it would not even then collide with either of the main girders.

The safety of both the bridge itself and the train passing over it is thus secured. But — as those charged with the maintenance of the permanent way have experienced—the advantage gained has been at the cost of a disadvantage.

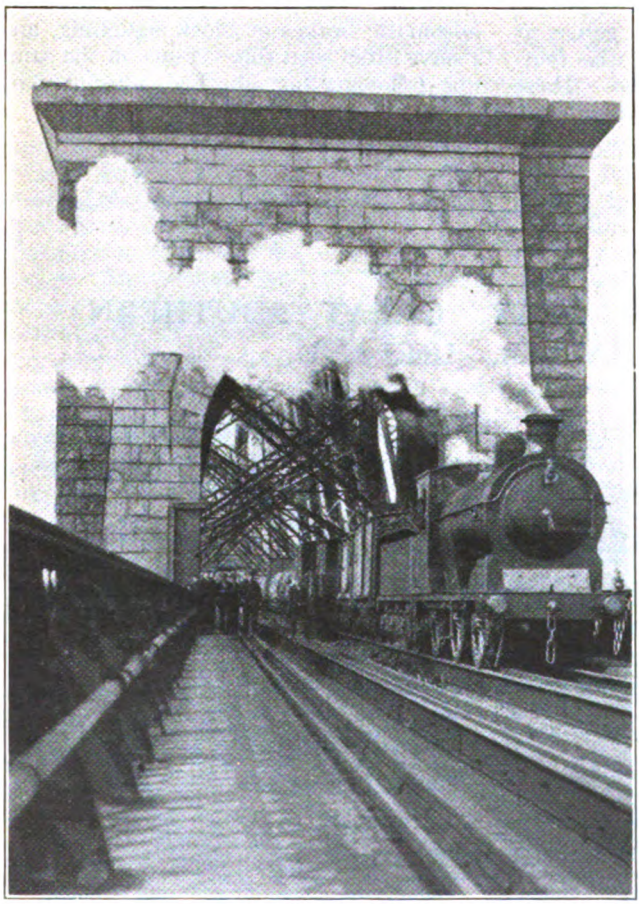

Photo.] [*Leslie J. Thompson.*

L.N.E.R. GOODS TRAIN CROSSING THE FORTH BRIDGE.

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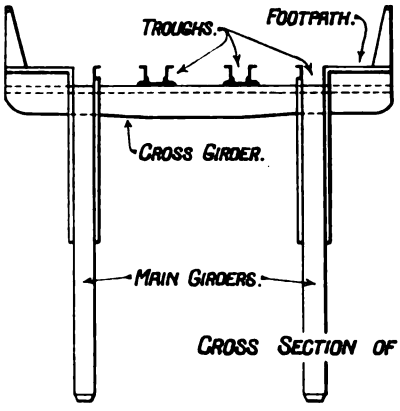
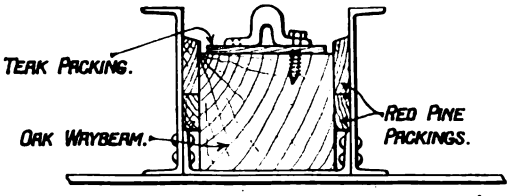


CROSS SECTION OF BRIDGE SHOWING POSITION OF TROUGHS.



CROSS SECTION OF TROUGHS SHOWING RAIL IN POSITION.

DETAIL DRAWINGS SHOWING SPECIAL CONSTRUCTION OF PERMANENT WAY.

This consists in the fact that as the outermost troughs are supported by the heavy main girders and the inner troughs by comparatively light cross girders spanning between the main girders, the inner troughs lack rigidity relatively to the outer ones and, consequently, suffer more from the vibration set up by passing trains, thus entailing a greater cost in maintenance.

But while this weakness of the inner troughs is undoubtedly present, it must be understood as merely a relative and not an actual one. The permanent way as a whole is strong and durable; and as regards the strength of the bridge itself, a walk over it will quickly bring the realisation that its giant cantilevers will continue to span the estuary of the Forth when many generations yet to come have passed away.

PORTSTEWART STEAM TRAMWAY, N.C.C., L.M.S.R. (IRELAND).

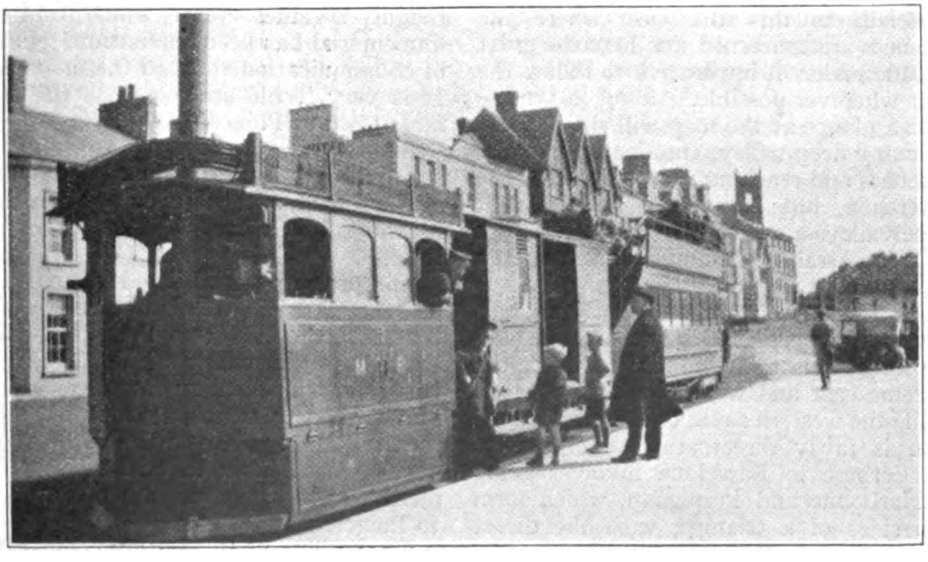


Photo.] [*L. J. Carrington.*

THIS TRAMWAY, RUNNING FROM PORTSTEWART STATION, NEAR PORTRUSH, IRELAND, TO THE COAST, HAS NOW BEEN CLOSED.

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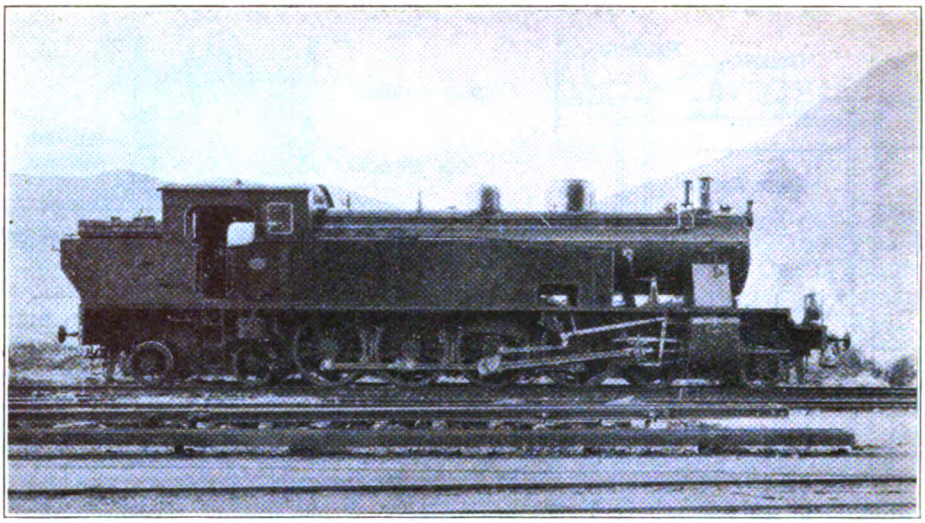

4-8-4 TANK ENGINE USED ON THE LINE.

The New Trans-Pyrenean Railway in Spain.

By R. V. UNWIN.

TO understand the reasons which have actuated the engineers when building railways in Spain, it is invariably necessary to make a study of the geography or lie of the land. Especially is this the case where the Pyrenees are concerned, for here the great altitude makes it imperative to follow the river wherever possible.

As a glance at the map will show, there are many deep valleys running up into the Pyrenees and reaching very often near the watershed, but it will be noticed that these valleys almost invariably end, either in an impassable mountain barrier, or in a pass or col at a great altitude.

For this reason, until recently no railway was in operation between Spain and France except those on the coast at the extreme east and west of the mountains. While the western route to Madrid through Irun is fairly direct, the eastern route via Cerbere to Barcelona involves going to Narbonne and Perpignan, which form two sides of a triangle, with the direct route.

For this reason some 17 years ago it was decided to construct a direct route from Paris to Barcelona via Toulouse, Ax-les-Thermes, Puigcerda, joining the existing Northern Railway line at Ripoll. The construction of this line was made possible by the existence, some 50 kilometres from the sea, of the plain of the Cerdagne, that unusual upland valley, roughly 20 miles square, which from time immemorial has been the natural channel of communication through the mountains. It is very fertile and contains the fairly large town of Puigcerda.

Even this, however, can only be approached from Barcelona, via the valley of the Rigart, and this is barred at its head by the Col de Tosas, 5,800 feet above sea level.

The problem which faced the engineers on the Spanish section then, was to construct the line from the Norte line at Ripoll up the valley of the Fresser to Ribas, in which valley there was already a main road to complicate matters, thence up the Rigart valley to the Col de Tosas, which would have to be tunnelled, and finally down again on the opposite side to Puigcerda.

Since a line of this nature could hardly pay its way for many years to come, the construction was undertaken by the State, and all materials used have been exclusively Spanish.

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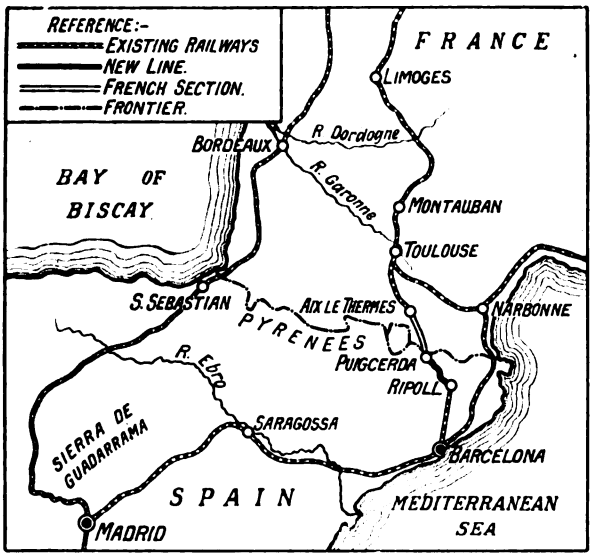

SKETCH MAP SHOWING NEW LINE AND CONNECTIONS.

The rails which are flat bottomed and attached to the sleepers by screw bolts, according to the standard practice in Spain, weight 50 kilos. per metre, the ballast was simply broken up from the rocks removed as the line advanced. The gauge is Spanish standard, 5 ft. 3 in.

The locomotives built by La Maquinista Terrestre y Maritima of Barcelona in 1923 are 4-8-4 tanks, the fixed wheelbase being kept as short as possible.

They are very powerful and follow the same lines as the M.Z.A. 4-8-0's described in the RAILWAY MAGAZINE, December, 1920. They are numbered 1-7, works nos. 146-152.

DIMENSIONS.

Inside diam. of cylinders ..	21·36 in.
Stroke..	26 in.
Diam. of driving wheels ..	4 ft. 10½ in.
,, bogey wheels ..	2 ft. 9½ in.
Wheelbase fixed	16 ft. 1 in.
Length overall	50 ft. 2½ in.
Grate area	33½ sq. ft.
Height to top of funnel ..	13 ft. 11¾ in.
Heating surface—	
Firebox	145·31 sq. ft.
Tubes (interior)	1,485·43 ,,
Superheater	487·76 ,,
Total	2,118·50 ,,
Weight of engine empty ..	75 tons.
,, in working order ..	98 ,,
,, available for adhesion	60 ,,
Boiler pressure	180 lb. per sq. in.
Tractive effort at 65 per cent.	1,047 kilos.
Water-tank capacity ..	2,460 gallons.
Coal capacity..	3½ tons.

The rolling stock is all of the eight-wheeled corridor type, built by Carde y Escoriaza at Zaragoza, while a through 1st and 2nd class carriage of Norte stock runs daily from Barcelona to Puigcerda.

Leaving Ripoll, the River Fresser is first crossed, and as it is very wide at this point, a long girder bridge was necessary. Immediately after the bridge a tunnel about ½-mile in length is entered, emerging from which Ripoll is seen to have been left behind. The line is now on the right bank of the river. For 5 kilometres to Camp Devanol the valley is fairly broad and no difficulties occur, but soon after this station the line crosses to the left bank and begins to climb rapidly, several tunnels being passed.

At Baños de Rinas, 11 kilometres, the river is again crossed, also the road this time, by a three-arched masonry bridge.

Tunnels now succeed in quick succession, many of them being snow sheds, where the nature of the hills makes it likely that heavy avalanches of snow might block the line. All the tunnels are lined with concrete and have handsome portals in masonry, the arch being of a very beautiful pink marble-like stone, which is plentiful here.

The next station is Ribas, 14 kilometres, the most important place on the route. There are several large spinning works here, which, with the lumbering industry, provide a fair amount of goods traffic for the line.

Ribas is also a popular summer resort from Barcelona, while winter sports are held when the snow is suitable. Between April and October there is no snow in the valleys.

Leaving Ribas the gradient becomes terrific being 1 in 22, for a considerable distance. Two tunnels through the solid rock are passed and the line leaves the Fresser, and proceeds up the Rigart Valley. Just before Tosas station, km. 30, the line doubles back on itself and enters a horse-shoe tunnel, finally emerging much higher up but not much further on. The next tunnel is the one under the pass and is

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4 kilometres in length. Emerging on the Northern side of the range, the line runs down the valley, until it finally reaches the plain of the Cerdagne across which it runs in a dead straight line parallel with the road to Puigcerda.

The scenery all the way from Ripoll until the Cerdagne is reached is extremely beautiful. The mountains rise extraordinarily steeply from the river; the lower slopes are thickly clad with pines, which are succeeded by the elevated pastures which are so splendid for cattle raising.

Above these again, the snow gleaming in the bright sunlight stretches up to meet a sky far bluer than we ever see it in England. As the train emerges suddenly from the blackness of the tunnels the contrast is extremely vivid. At Puigcerda a large goods yard with numerous sidings has been constructed, but as yet the traffic is very small.

There is one goods train and one passenger train each way every day. The latter have a through carriage from and to Barcelona and take 2 hours for the 50 kilometres on the new line.

What strikes one especially about the line is that owing to the terrific gradients and almost innumerable tunnels it would have been much more practical to employ electric traction, especially as the mountain valleys teem with water power.

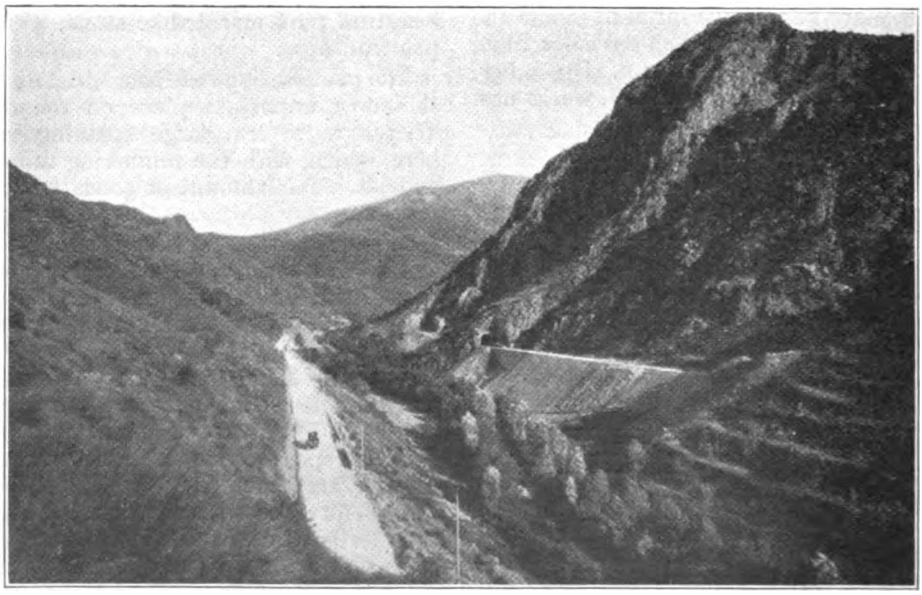
However, this would have added greatly to the cost, already enormous, of building the line, while the infrequency of the trains at present, does away with most of the advantages of electrical working.

At present, passengers going into France have to cross to Bourg Madame, about 2 kilometres, where the Midi electric railway connects with Perpignan and the North, because as yet there is no sign of the French section from Ax-Les-Thermes being completed.

The road over the pass now carries very little traffic as the motor buses which used to be the only link between Puigcerda and the rest of Spain no longer run, while all goods go through instead of over the mountains.

I am indebted to Señor Serat of the Maquinista Terrestre y Maritima for his courtesy in supplying the photograph and dimensions of the locomotives.

The other view of the line was taken by a Spanish gentleman just before the rails were laid on the upper section in 1921. The line was opened for traffic at the end of 1923.



THE RAILWAY AND ROAD JUST AFTER LEAVING RIBAS.

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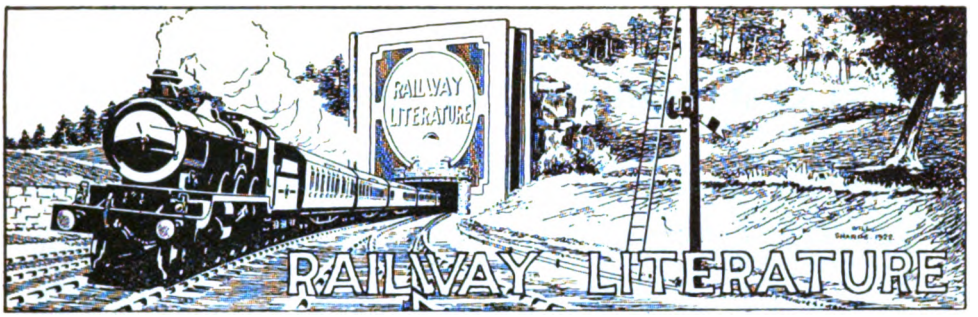
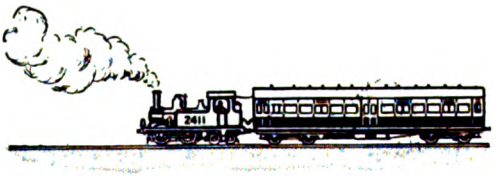


PEGASUS: PROBLEMS OF TRANSPORTATION. By Colonel J. F. C. Fuller. Published by Kegan Paul, Trench, Trübner & Co. Ltd., Broadway House, 68–74, Carter Lane, London, E.C. 4. Price 2s. 6d. net.

This little volume of 95 text pages has been issued in the publishers' series of booklets under the general heading of "To-Day and To-Morrow." It can hardly be said that the author has added to a valuable degree to the literature of transportation, in that the contents consist mainly of a series of moralisings and somewhat unconventional thinking expressed in terms which read rather strangely to anyone used to the more serious literature of the railway and of transport generally. We have no doubt, however, that by some of our readers, at least, Colonel Fuller's remarks will be appreciated. In the brief introduction somewhat unnecessary reference seems to be made to the Gattie system, which, whatever Colonel Fuller may think, certainly cannot be regarded as having epoch-making characteristics, seeing that the trouble with that system was that it required everything else to be adapted to suit the originator's scheme. Then follows a section entitled "The Battle of the Iron Horse," wherein, in conjunction with some remarks on the Railway Centenary and the work of George Stephenson, we have such mystifying sub-titles as "The Protean Problem," "The X-Ray Transporter," "The Nature of the Beast," and "Protean Ignorance." Later, the author deals with mechanical transport generally (where, apparently, he is on surer ground), under the general heading of "The Conquest of the Elysian Fields," with further peculiar sub-titles. Several plate illustrations are included—all, however, relating to the second part.

CANADIAN TRAILS REVISITED. By Eldred G. F. Walker. Published by William Stevens Limited, Henrietta Street, Covent Garden, London, W.C. 2. Price 3s. 6d. net.

This volume is a sequel to one written some twelve years ago dealing with Canadian travel impressions, as utilised for articles published in the *Bristol Western Daily Press* and then presented in book form under the title of "Canadian Trails." The present volume describes a visit paid during the latter part of last year, special attention being given to the changes which the intervening period had brought forward. The book is pleasantly written, and has about thirty illustrations on plate paper. Incidentally, it includes many railway references. In the main, however, the author is principally interested as an agriculturist and as a Somerset man. As a collection of observations and interesting travel talk, however, it can be cordially recommended to our readers, while the railway references are sufficient to justify review in these pages.



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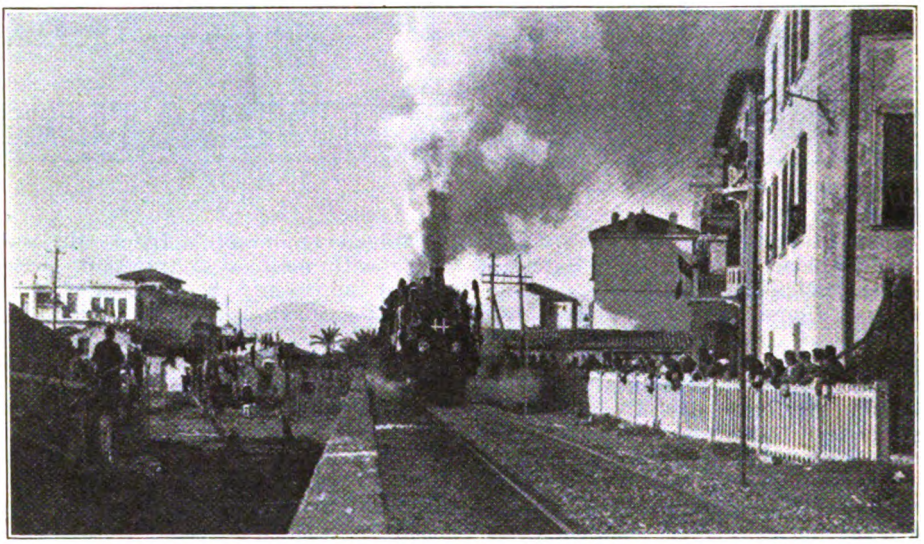
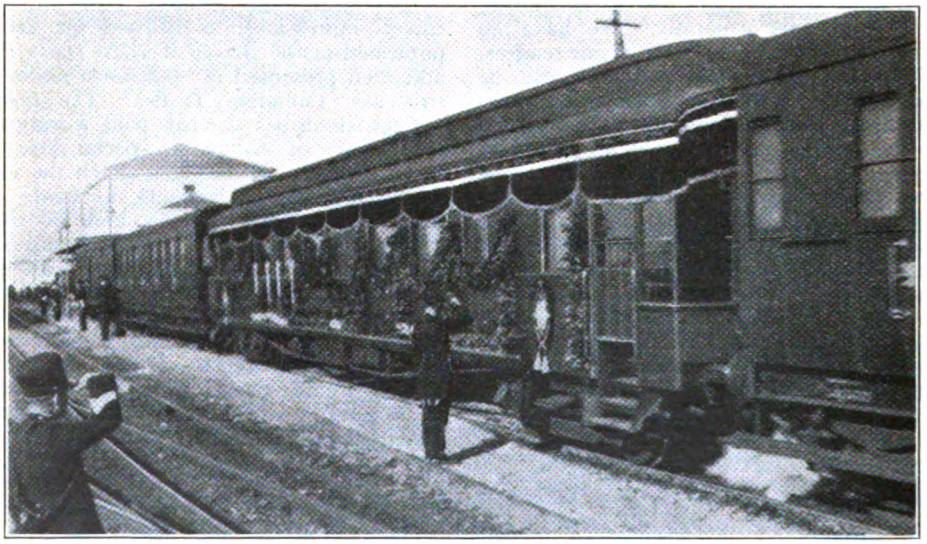
QUEEN MARGHERITA OF ITALY'S FUNERAL.





We are indebted to Mr. Craufurd Hutchison for the two photographs reproduced showing the train which conveyed the body of the late Queen Mother of Italy from Bordighera to Rome on January 10. Mr. Hutchison points out that the white markings seen on the side of the funeral car were electric torches arranged to light up the vehicle during the night journey through Italy. The train was drawn by two locomotives of class "625," and consisted of 14 vehicles: baggage car, first-class car, baggage car, saloon, Royal baggage car, two Royal saloons, one sleeping car, one Royal saloon, two first-class coaches, the funeral car, one first-class carriage, and baggage car.

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RAILWAY MAGAZINE *readers desiring information should mark envelopes " Query " in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning " British Locomotive Practice and Performance " may be addressed to Mr. Cecil J. Allen, c/o* RAILWAY MAGAZINE, *33, Tothill Street, Westminster, London, S.W.1. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or " grouping," the pages of the " Railway Year Book " (5s. net) should be consulted. The twenty-eighth Annual Edition (1925) of this standard railway reference work is now published. All previous Editions are out of print.*

0-4-0 Side-Tank Locomotives, S.R.

In view of the fact that your inquiry and certain other references made in " Locomotive Matters" indicate considerable interest in the engines to which you refer, we have been favoured by the Southern Railway with the following information: The 14 engines of the 0-4-0 type, built by the L. & S.W. Company and allocated to Southampton Docks, are numbered and named as under :—

81 *Jersey.*	96 *Normandy.*
85 *Alderney.*	97 *Brittany.*
86 *Havre.*	98 *Cherbourg.*
89 *Trouville.*	101 *Dinan.*
90 *Caen.*	102 *Granville.*
93 *St. Malo.*	147 *Dinard.*
95 *Honfleur.*	176 *Guernsey.*

The remaining engines of this type are numbered only: 82, 83, 84, 87, 88, 91, 92, 94, 99, 100 and 103. With regard to the second part of your inquiry, it is suggested that you have quoted the engine name incorrectly, and that you refer to a small saddle-tank engine sold by the L. & S.W.R. in 1916 to Messrs. Kynochs, and which was named *Ritzebuttel.* This engine was built by Shanks & Company in 1873, and so far as records go, it bore that name when purchased.

[Reply to " BRETWALDA."]

Midday Anglo-Scottish Expresses.

Although neither the 1.15 p.m. from King's Cross nor the 1.30 p.m. from Euston, and the corresponding return trains from the North, leave actually at midday, the term " midday " is often used as a convenient means of distinction from the morning and night Anglo-Scottish expresses, in that they provide departures on an approximately midday basis, an important point being that business men are able to attend at their offices before leaving. Obviously, it must occasionally happen that, if we refer to an engine as working on a particular section, by the time such a statement is published it has been transferred to another shed. Consequently, any statements as to engine stations and duties which we may publish must be interpreted as applying at the time the information is sent to us.

[Reply to W. T. THORNEWELL.]

Locomotive Duties.

Certain " Castle " class locomotives on the G.W.R. are included in the link which covers the London–Plymouth and other long runs. Hence it will usually be only such engines as are in that link which can be seen on the trains in question, others

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working miscellaneous duties or runs which can be completed out and home the same day, unless called upon to replace one of the other locomotives. We cannot answer questions as to the stationing of locomotives, as this is always liable to be changed before a statement can be published. We note that No. 4093, *Dunster Castle*, should be added to the list given in the October number.

[Reply to "DARTMOUTH CASTLE."]

G.W. Locomotives.

A number of two-cylinder 4-6-0 locomotives, although numbered in the "2900" series, include in their concluding numerals the number which they bore when there were only a few miscellaneously numbered locomotives of the class in service. No. 2998, *Ernest Cunard*, is one of these. If we understand rightly the new workshops at Caerphilly are intended to deal with the local requirements of the South Wales lines. It is not likely that they will also deal with main line locomotives and rolling-stock in place of Swindon, though they may be called upon to assist in times of pressure.

[Reply to "TALISMAN."]

Tube Railway Operation.

Definite sequences of stations to be passed by trains were selected and the indicators at stations designed accordingly. The signalman at the commencement of the automatic section sets these as the trains leave in order, after which the indicators are changed automatically as the trains proceed. Many sections of the late South Eastern & Chatham Railway have received attention in the pages of THE RAILWAY MAGAZINE, though we cannot call to mind an article dealing particularly with suburban services on any specific section.

[Reply to "PICCADILLY."]

Light Screens on Signals.

In some locations, if a driver was standing close to a signal he might be able to see the light through the lower (green) spectacle glass, although the signal itself was at "danger." In such cases, and in other instances where it might be possible for a light to show indirectly through the green glass, screens are fitted, as, otherwise a driver might be inclined to assume that the signal had been lowered for him. Many parts of the "Chatham" section of the S.R. still involve restrictions as to the engines which may work thereover.

[Reply to G. E. FENTON.]

Canterbury and Whitstable Railway.

By their Act of 1844 (Ashford to Ramsgate, &c., lines) the South-Eastern Railway acquired powers to lease the undertaking of the Canterbury and Whitstable Railway Company, and they engaged to lease the railway and harbour for a term of fourteen years from 1846 to 1860 inclusive, but in 1853, before the expiration of the fourteen years' lease, the South-Eastern Railway purchased the entire undertaking of the Canterbury and Whitstable Railway Company at par.

[Reply to "SUBSCRIBER."]

Southern Railway Locomotives.

To some extent, 2-6-0 locomotives of Mr. Maunsell's design are being employed on the "Brighton" section. Your inquiry as to No. 20A is possibly due to the fact that, for a time, some of the Woolwich built 2-6-0's were used with numbers such as that mentioned, though we cannot recollect exact details. We believe that all these engines are now numbered in the "810" series; otherwise, we have no knowledge of the particular engine referred to. [Reply to J.K.C.]

Wagon Weights.

A 10-ton wagon is one designed so that it can take a load of 10 tons, and similarly with other weight designations. Whether the full weight can be carried is governed, of course, by the space, in that a wagon may often be full with, perhaps, only 40 per cent. of its nominal load reckoned on a weight basis. Tare is the weight of the vehicle, so that a wagon having a tare of 6 tons and carrying a 10-ton load would represent a haulage weight of 16 tons.

[Reply to G. E. FENTON.]

Articulated Electric Locomotives.

When placed under one framing, there is, of course, a fixed connection between each bogie and the frame through the pivot or equivalent arrangement. In the case of locomotives in separate sections, the question of wheelbase does not arise, in that each section is a complete unit in

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itself, though, electrically, each is under the control of one driver, as in the case of multiple-unit electric trains.

[Reply to K. H. S. MASSEY.]

Lengths of Platforms at Paddington.

The following are the lengths (from top of ramp to top of ramp) of platforms at Paddington station, G.W.R. No. 1A, 936 ft.; No. 1, 1,147 ft.; No. 2, 1,004 ft.; No. 3, 1,011 ft.; No. 4, 815 ft.; No. 5, 817 ft.; No. 6, 788 ft.; No. 7, 747 ft.; No. 8, 947 ft.; No. 9, 875 ft.; No. 10, 772 ft.; No. 11, 812 ft.; and No. 12, 619 ft., making the aggregate length of all platforms, 11,290 ft.

[Reply to D. GARROD.]

"King Arthur" Locomotives, S.R.

The "736" series was designed by Mr. R. W. Urie, the earlier engines coming out in 1917-18. They are not, therefore, correctly "King Arthur" class locomotives, though, as that term is used generally, they are included, and, like the true "King Arthurs," have names taken from the Arthurian legends. Cylinders are 22 in. and not 20½ in. diameter.

[Reply to "STANDARDISER."]

Locomotives in Accidents.

For some time past, we have given in "Pertinent Paragraphs" extracts from the official reports of accidents, largely in order to include particulars of engines concerned. The Hope accident was dealt with last month. We cannot go back to accidents which occurred several years ago; neither can we say whether the engines concerned are still running.

[Reply to "MACCLESFIELD."]

Automatic Couplings in Australia.

Seeing that vehicles fitted with automatic couplings are liable to have to work with vehicles not so fitted, it is, obviously, necessary during the transition period to provide for either type being used. Presumably, when the change is completed, the superfluous equipment will be removed.

[Reply to K. H. S. MASSEY.]

L.N.E.R. Wagon Markings.

The wagons you noted are, apparently, some which have been marked experimentally according to a system which is in process of development, though the details are not yet finally settled and the system in question has not yet been definitely adopted.

[Reply to K. A. WERRETT.]

Pullman Trains in Unusual Places.

It is by no means uncommon for trains composed entirely or mainly of Pullman cars to be run on unusual routes to meet the requirements of special race traffic, and it was, presumably, one of these trains which you saw passing through Ashford, Middlesex.

[Reply to E. C. KENT.]

The Tay Bridge Accident.

As you are resident in London, we suggest that you go to the Newspaper Room at the British Museum and see the report of the Court of Inquiry. Ask for "Parliamentary Papers 1880, Vol. XXXIX."

[Reply to G. S. WALKER.]

Southern Railway Locomotives.

We have no further details yet as to the new 4-4-0 locomotives under construction for the Southern Railway. No doubt, further "King Arthur" class locomotives will be placed in service on the Eastern section in due course.

[Reply to R. H. YOUNG.]

Torrington and Halwill Line.

The correct title of this railway is the North Devon and Cornwall Junction Light Railway. It was described in the September, 1925, issue of THE RAILWAY MAGAZINE. You will note that it is already in use.

[Reply to "WYOMING."]

Eight-Coupled Locomotives, L.M.S.R.

As there are several series of the 0-8-0 and 2-8-0 locomotives on the L.N.W. section, we suggest you obtain a copy of Mr. Williams's list, of which particulars appear in our advertising pages.

[Reply to "0-8-0."]

Locomotives Scrapped.

We cannot answer queries as to the fate of individual locomotives, except occasionally, when an engine having a special reputation or history is concerned.

[Reply to P. MURRAY.]

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The "Flying Scotsman."

A booklet under this title has been recently published by the L.N.E.R., and copies can be had from the Advertising Department at King's Cross and elsewhere on the system, price 1s. This shows that the train known as the *Flying Scotsman*—the 10 a.m. from King's Cross—has been running since 1862, very much longer, of course, than the *Cornish Riviera* and other special expresses of recent date. L.N.E.R. 4-6-2 locomotives have been timed at speeds almost, if not quite, reaching 90 m.p.h. They were not, however, constructed with a view to exceptionally high speed, but rather for working heavy trains at good average speeds.

[Reply to "SCOTSMAN."]

Motor Trains, L.M.S.R.

The only information we have as regards the motor train concerned in the Llandudno accident is that the engine was No. 760 and the vehicles Nos. 5345 and 7984. The Ministry of Transport report on the accident gives no indication of the number of the motor set. We cannot give particulars of the vehicle numbers comprised in particular sets, and can only suggest that you ascertain them for yourself.

[Reply to "7984."]

L.S.W. Matters.

We have no information as to when the flyover at Battledown Junction beyond Basingstoke was completed. Pullman cars ran for a number of years on the L.S.W.R., principally on the Bournemouth route, but were withdrawn in the early years of the present century.

[Reply to "458E."]

Named Locomotives, S.R.

You are correct in pointing out that we have not given a list of names of the new 4-4-0's under construction for the "Brighton" section. Our previous reply was based upon a misunderstanding as to the actual query put to us.

[Reply to W. G. BOYDEN and others.]

Isle of Wight Locomotives.

A number of these have been referred to in "Locomotive Matters" in recent issues, but we have no further details as to Nos. 3W and 4W.

[Reply to L.S.S.]

Named Engines, G.W.R.

4-4-0 No. 3282 used to carry the name *Chepstow Castle*. The fact that that name is now utilised for a 4-6-0 explains why the old engine has lost it.

[Reply to D. B. HART.]

Numbers of Locomotives.

We cannot undertake to supply lists of numbers of engines of particular classes. Please see rules at the head of this section.

[Reply to W. J. ALMOND, R. C. HARRISON and others.]

Named Locomotive, L.N.E.R.

N.E. type 4-6-2 locomotive No. 2401 is named *City of Kingston-upon-Hull*.

[Reply to "HOCKERILL HALT."]

G.W.R. Locomotives.

Usually, engines which come in for rebuilding are given chimneys of the pattern standard at the time if a new one is required, but we cannot speak for the Chief Mechanical Engineer as to his intention in any particular case. The 2-6-0 locomotives are capable of reasonably high speeds, and often work semi-fast or secondary expresses, occasionally in replacement of a 4-6-0 engine, but they are not, of course, intended for high speed service.

[Reply to W. JONES.]

Numbers of Locomotives.

We have several times explained that we cannot give the numbers of locomotives either of particular classes or of those stationed at a particular depot.

[Reply to "LYONNESSE" and "418."]

Single Driver Locomotive.

So far as we know there are now no single driven locomotives in service in Ireland, though two or three have been preserved.

[Reply to I. K. A. MURRAY.]

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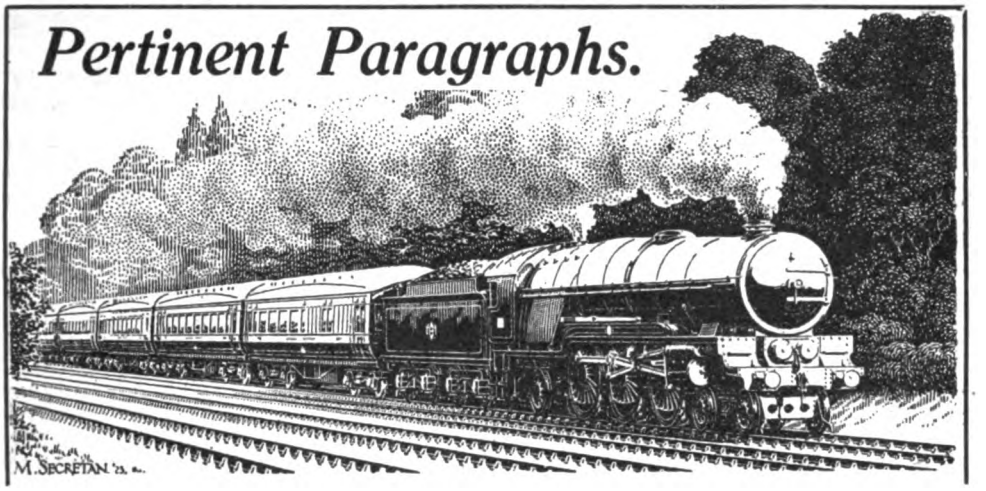
Pertinent Paragraphs.



Southern Railway's Most Popular Poster.

IN THE RAILWAY MAGAZINE for June, 1925, we illustrated the well-known poster issued by the Southern Railway, showing a keenly-interested small boy gazing up at the engine attached to the 11 a.m. West of England express from Waterloo. This poster, reproduced in various sizes, has not only proved exceptionally popular here, but has been in great request from all over the world, and large numbers have been sent out from Waterloo in response to requests. It is now announced that this poster is to be retained as a standard for issue annually in the Spring.

When first introduced we told the story of this poster, in regard to which the remark is made: "So in years to come, Ronald Witt, at present a little boy living with his father in California, who by chance happened to be the subject of a snapshot at Waterloo Station, may return to this country and still see himself as he stood that day with his little attaché case in his hand and one foot turned excitedly in towards the other, gazing with eyes of admiration and envy at the driver about to start on his journey to 'Sunshine Land.'"

Long Station Platforms.

THE announcement that a platform 2,175 ft. long would be made by the joining of the Exchange and Victoria stations at Manchester, which in pre-grouping days were owned by the L.N.W. and L. & Y. Railways respectively, caused considerable interest. This platform, it was stated, thus acquired the distinction of being the longest in the world, and as far as we are able to ascertain, this is so. Controversy arose, however, as to the second longest, and among the claimants for this were York, 1,692 ft.; Edinburgh (Waverley), 1,680 ft.; Aberdeen, 1,596 ft.; Crewe, 1,509 ft.; London (Victoria), 1,500 ft.; and Cambridge, 1 486 ft.; while from abroad, Albury, in New South Wales, and Bulawayo, in South Africa, were put forward for the second place. The two latter can be ruled out, as they are shorter than Cambridge; Albury, which is longer than Bulawayo, being 1,350 ft. long. From recent observations in Scotland, all except York, unless the ramps are there included, must also take a back seat. On a recent visit to Perth we were struck by the length of the up platform, which, owing to its curvature, looks shorter than it really is. On inquiry we were informed that a recent measurement determined the length of the up platform to be 1,691 ft., excluding the ramps, which would add a further 58 ft. to the tally. It would seem, therefore, that, while Manchester has the longest platform in the British Empire, Perth General station can boast the second longest platform, and it would be interesting to know whether any of our foreign contemporaries have anything to rival these figures. The length of the Perth General station platform is, of course, accounted for by the fact that there is a considerable interchange of traffic there.

Railway Anti-Collision Devices.

SINCE the early days of railways, inventors have devoted attention to scheming ideas for preventing, or at least minimising, the effects of collisions between passenger trains. One of the most practical applications, which under actual, as well as "rehearsed," conditions proved itself a success, was Mr. J. G. Robinson's corrugated device applied to the ends of the coaches, so that in the event of a collision, over-riding of the vehicles was prevented. One rather far-fetched notion was that of applying running tracks to the top of the coaches forming a train, the

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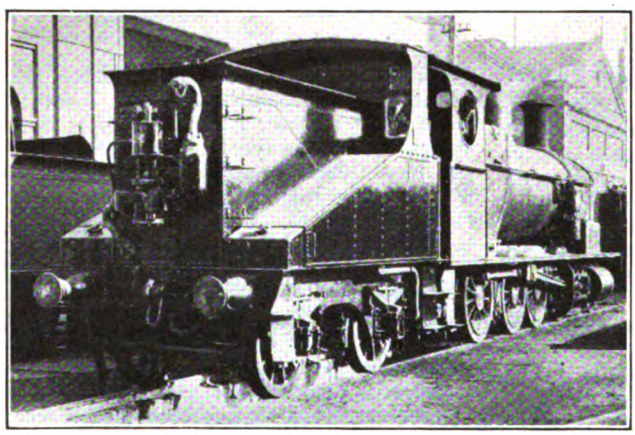
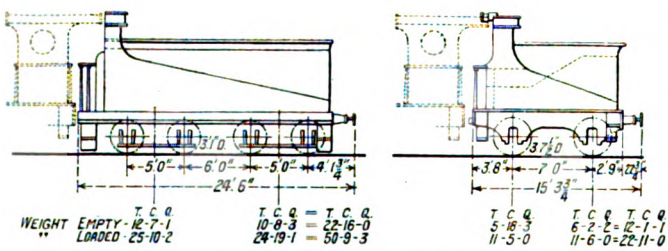
overhead "tracks" grading down to the level of the ordinary permanent way in advance and at the rear of the train. This formed the subject matter of a patented invention of foreign origin, the idea being that overtaking or head-on collisions might be averted by one train running over the top of the other. In his address, entitled "Railway Notes—Old and New," at the Institution of Mechanical Engineers, Sir John Aspinall reminded his hearers that the reason why, on the London and North Western Railway, the tender frames were made of timber for so many years was that, according to the views of the then Locomotive Superintendent, Mr. John Ramsbottom, the tender between the engine and the train should be the weakest part of the train, and that this should break up first in case of collision and thus save the passenger carriages. The idea seems to have been similar to that of the breaking spindle in a rolling mill. It is not recorded whether this idea was substantiated by results in practice.



GENERAL VIEW OF LOCOMOTIVE WITH SPECIAL TENDER.



DETAILS OF SPECIAL TENDER: TWO FORMS.

Sloping Tenders for Locomotives.

The accompanying illustrations, for which we are indebted to Mr. E. E. Lucy, Chief Mechanical Engineer of the New South Wales Government Railways, show two separate types of tender for shunting and branch-line locomotives. These are of a special design having sloping sides, the purpose being to provide a perfectly clear outlook for the driver and fireman, and at the same time to enable a tender locomotive to fulfil all the functions of a tank engine, and thereby avoid the creation of another class of engine on these railways.

In describing the arrangement, Mr. Lucy remarks that all that is necessary is to take a tender engine from any of the 500 possessed by the railways, and attach to it one of these small tenders, when it at once becomes in effect a tank engine suitable for double-ended trips to the harbour or docks, for shunting in marshalling yards, and pushing trains up severe gradients. The unobstructed outlook when travelling tender first will appeal to all locomotive drivers.

Designs for a larger tender of similar design have also been prepared. This is of the eight-wheeled pattern, whereas the smaller one has four wheels only. This tender carries 4,000 gallons of water and 10½ tons of coal, the figures in the case of the smaller tender being 1,800 gallons and 2½ tons of coal. The weight distribution, wheelbase, &c., figures are shown on the accompanying diagram drawings.

Sheffield and Rotherham Railway.

An esteemed correspondent favours us with a copy of a photographic reproduction of the four-page prospectus which was issued in 1834 in connection with the railway then proposed from Sheffield to Rotherham.

In enumerating the advantages of the proposed new line, the existence of navigation between the two places was not lost sight of. This amounted to 6½ miles in length, "of which length the Sheffield and Tinsley Canal forms four miles and a half." The latter undertaking, the prospectus states, was successfully brought before the public in the year 1814, "but, unfortunately for the proprietors, and for the public more especially, the southern side of the River Don was adopted in spite of many remonstrances, and a high level chosen for the line at a considerable pecuniary sacrifice, rather

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to serve individual interests than to give general accommodation."

It was contended that the number of passengers on the projected railway would be very great, "from the fact of the population of the parish of Sheffield being nearly 100,000, and that of Rotherham nearly 10,000, and that no fewer than 250 persons are conveyed daily between the two towns, by coaches and Waterloo cars. But it is reasonable to believe that the number would be increased by the railway to at least 500 per day, a much greater proportionate increase having taken place between Liverpool and Manchester, owing to the novelty, regularity, cheapness, and speed of this kind of conveyance. Passengers may be profitably conveyed the whole length of the proposed railway, from Sheffield to Rotherham, in less than 20 minutes, for 6d. each."

The prospectus concluded with the statement that the line "has been carefully surveyed with a view to the combination of Economy and general Convenience by Mr. Henry Sanderson, of Sheffield; and it deviates but little, so far as it extends, from the once projected Goole Line, approved by that eminent railway engineer, George Stephenson, Esq. The estimated Cost is £50,000 . . . and the estimated net Annual Income about £7,650, being more than fifteen per cent. on the Capital advanced. . . . It is proposed to raise the Capital Sum of £50,000 in 2,000 shares of £25 each."

Fog Misunderstanding Causes Accident.

On November 20, at Wincobank, near Sheffield, L.M.S.R., the 2.10 p.m. train from Derby to Sheffield, while standing at Wincobank North Junction up home signal, was run into in rear by the 3.26 p.m. train from Doncaster to Sheffield. The former train was drawn by 4-4-0 engine No. 719, the latter by 0-4-4 tank engine No. 1393. Considerable damage was done to the rolling-stock, and particularly to three horse boxes at the leading end of the first train. Sixteen passengers complained of shock or injuries, these being of a minor character in the case of fourteen. The collision occurred in dense fog, which had prevailed for some days in the district, and this explained why the driver of the second train had no chance of minimising the results. Responsibility is attributed by Major G. L. Hall, in his report to the Ministry of Transport, only to the signalman on duty in the box concerned, and to a sub-ganger who was working with him on ground duties, his function being locally known as that of "tail lamp man." There were several discrepancies in the versions given by these men of the circumstances attending the movements of the trains and the various messages which were exchanged, and, as the inspecting officer suggests, "it is obvious that the men were at cross purposes." It is pointed out, however, that "it would be manifestly unfair to disregard the extremely difficult conditions under which they were both working." The bookings showed that trains were following one after the other, each being offered as soon as the one in front cleared, while they were badly out of course and identification was difficult. Further, the signalman was also concerned with shunting and other movements on his goods roads and sidings, while the groundsman was also severely handicapped. The latter had, moreover, been engaged on extended duty owing to a derailment the night before, though, as the report points out, "he could have asked for special relief if he had felt unfit for duty that morning."

A Question of Safeguards.

The report concludes as follows:—

"It is, of course, possible to safeguard mistakes of this character by many well-known mechanical devices, including track circuiting behind the home signal and the special rotary interlocking block used on several sections in the Midland Division. The general conditions here, however, are not such as would normally call for the installation of any devices of this character. The security afforded by ordinary block working, supplemented by fog signalmen when conditions necessitate their employment, should suffice for the safe operation of traffic, provided that care is taken to avoid the misinterpretation of important information. This can only be done by a more systematic procedure in the interchange of these messages than was apparent in this case. With a frequent train service it is obviously very important that there should be as short an interval as possible between the passing of a train and the necessary report from the fog signalman. The adoption between the men concerned of some definite procedure appears to be the simplest remedy against subsequent misunderstanding. It may prove that under exceptional conditions, having regard to the number of roads concerned and the train frequency, the necessary precision cannot be ensured without providing the ground fog signalman with a watch so that he may note and report the exact time of the passing of each train. Such an arrangement would at least ensure that a message referring to a train which had passed some minutes previously was not taken to apply to a subsequent movement.

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"Reference has been made in the report to the difficult conditions under which these men were working, and it is, I think, due to signalmen and others generally to remark upon the high degree of security which is in general attained under these very adverse conditions, as a result of the care and attention to duty which is shown by the men concerned."

Another Collision in Fog.

On November 16, at Hyndland, near Glasgow, L.N.E.R., as a train from Hamilton was approaching this terminal station under clear signals, a train for Edinburgh moved out of the north platform, resulting in a side-long collision near the signal-box. Dense fog prevailed at the time. Six passengers in the incoming train and the fireman received minor injuries or suffered from shock. The Hamilton train was drawn by 0–6–2 tank engine No. 2583, while the Edinburgh train was drawn by 4–4–0 tender engine No. 9415. The evidence varied considerably as to the density of the fog; in fact, fogmen who had been on duty all day had been dispensed with shortly before the accident, and, although the fog came on again, it was only suggested that the signalman would have been well advised to have taken steps to obtain the service of fogmen again, though it was not thought that had there been a fogman at the down distant signal—the normal fog-post—the case would have been affected, even if the fogman had had time to return to duty. Blame for the accident is attributed to the driver of the Edinburgh train, although there was considerable confusion in the evidence as between the signalman and others concerned. The starting signal being found in the lowered position after the accident, to which reference was made in support of the claim that the driver did not start against the signal, was explained by the fact that the leading coach of the incoming train was lying on top of the signal wire, and no support is given to the view that it had been lowered before the train started.

"Across India by Rail."

Referring to Mr. Sullock's article under this title, published in the February number, the Rev. W. Machin, writing from Stoke-on-Trent, comments as follows:—"The junction several times called 'Mochal Sarai' in the article should be 'Moghal Sarai.' 'Balaman' should be 'Balamau,' and 'Llakhsar' should be 'Lhaksar.' The branch from Lucknow to Cawnpore is not Great Indian Peninsula, though the trains of that railway have running powers over it from Cawnpore to Lucknow, but is a branch of the Oudh and Rohilkhand Railway.

"I notice that the writer was delayed in his journey by the E.I.R. Punjab Mails having been attached to an ancient 4–4–0. This is, curiously enough, not infrequently the case. I have myself been delayed at Moghal Sarai for the same reason. The American 2–6–0 engines mentioned by the writer are now mainly used for shunting, though they are tender engines, and on branch lines. They are understood to use more coal and oil than other engines in proportion to the work they do. Tender engines are used a good deal for shunting on the O. & R. Railway, which railway has very few proper shunting engines, and, indeed, very few tank engines at all. Until recently this work was often done by very old 0–6–0 tender engines, with tall chimneys and high domes on the firebox, surmounted by the safety valve, of an ancient pattern. 4–4–0 old express engines are quite often seen on this work at Lucknow and elsewhere, as well as the SG class of large-boilered goods engines (0–6–0 tender engines)."

Midland 2-4-0 at Manchester (Victoria).

Mr. K. J. Holmes suggests that the explanation of the appearance at Manchester (Victoria) station of a Midland unrebuilt 2–4–0 locomotive, as mentioned on page 81 of the January number, is as follows: "Most trains between Sheffield, or the Peak District, and Manchester, *via* Chinley, run into Central station at Manchester. However, there are about three trains in each direction which work to and from Victoria station, and it was probably on one of these trains that Mr. Herbert saw No. 145. I also have seen it on these duties, as also 2–4–0 No. 231, 4–4–0's Nos. 356 and 358, and a large 0–6–0."

Railway Developments in Victoria.

In sending several interesting photographs taken on the Victorian Railways (one of which is reproduced), Mr. A. R. Prince, writing from Melbourne, makes the following remarks:—"On October 12 a service of electric trains commenced running between Melbourne and Fern Tree Gully, electrification of the latter end of the line having just been completed. This will provide a great relief during the summer season, when week-end holiday traffic is very heavy, Fern Tree Gully being one of the favourite centres for picnics and rambles for the people of Melbourne. The Sunday train service between Melbourne and Sydney, inaugurated a short time ago, has proved a great success, and fills a long-felt want. The new 'N' class ('Mikado' type) locomotive has lately been undergoing road trials, and is reported

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to be giving every satisfaction. A further two engines of the same class are likely to be built in the near future. It is rumoured that the Railways Commissioners intend giving the 'booster' arrangement a trial in freight traffic, and also that they have under consideration the introduction of a 'Pacific' type of engine for express passenger work. Beyond the fact that this will be of about 40,000 lb. tractive effort, no details have so far been made public."

Early Folkestone Stations.

"PERTINENT PARAGRAPHS" in the November issue, on early railway arrangements at Folkestone, may be supplemented by the following notes relative to the development of railway facilities in the district. The original Harbour station was on the north side of the harbour, but in 1850 the branch was extended across the harbour by a brick viaduct of 12 arches, and a swing-bridge at the south end. The swing-bridge is 138 ft. long, and at the time was said to be the largest ever constructed. It turns on a centre pivot, with clear openings of 50 ft. Fortunately it is required to be opened only infrequently. To do so takes about 15 minutes, as eight pairs of fishplates have to be taken out and 32 bolts unscrewed. The old-fashioned method of turning the opening span by windlasses was discarded about 30 years ago in favour of a wire rope working over a snatch block, operated by a steam crane on the quay side. The reverse process is gone through to close the bridge, and reconnect the lines. The South Side Harbour station, as built in 1850, had an all-over roof, with an overbridge connecting the two platforms. The Continental trains, then tidal, ran to and from this station, the boats arriving at and departing from the adjacent harbour. A pier was built out beyond the station with a platform for the boat trains; the boats (except at high water, when the harbour was still employed) used the pier. Later the pier was still further extended and all passenger boats now use it. As the residential part of the town grew alongside the Leas, the Harbour station, which had been the chief Folkestone station, became inconvenient for local passengers, and the service was gradually withdrawn, until now Folkestone Harbour does not appear in the time-tables. The one daily through coach usually arrives without any passengers, and some days it is not even worked down from the Junction. The through coach is worked back to Red Hill on the 4.14 p.m. from Folkestone Junction, which travels to London by this route.

When the pier was extended, rail access to the lines on the harbour side was rearranged. There was previously a turntable in the down road at the land end of the platform, in addition to connections at the other end. This turntable has been taken out, and consequently a building on the up side,

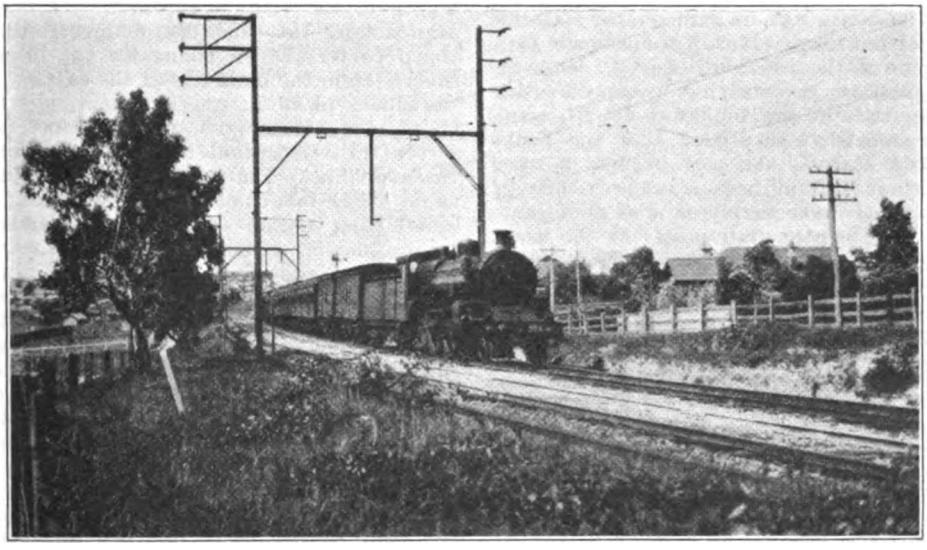

Photo.] [*A. R. Prince.*

HEALESVILLE-MELBOURNE TRAIN NEAR MOUNT ALBERT, VICTORIAN GOVERNMENT RAILWAYS.

4-6-0 Class A2 Locomotive No. 951.

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specially constructed for the safe custody of a bullion wagon, has no longer a rail connection. Presumably there is not sufficient bullion passing to warrant the use of these wagons, or at any rate the loaded wagon is not detained at Folkestone Harbour sufficiently long to require to be placed under lock and key in a building. The floor of this building is built up to the level of the underside of the axles, and the roof, built to the contour of the truck, fits close down on the latter, so that the truck only and nothing else, particularly a human being, can be housed in the erection.

Folkestone Junction.

THE Junction station, although opened over 80 years ago, is still on the extreme edge of the town. It is of the wayside type common to the late South Eastern Railway, one platform commencing where the other ends; the meagre buildings are of wood. It is somewhat surprising that the South Eastern Railway did not provide a more important station here; but evidently it was looked upon merely as a wayside junction, the Harbour station serving the town. Even then one might have expected that through (as apart from platform) lines for non-stopping trains would have been provided, as this was a feature of early South Eastern Railway practice, *e.g.*, Tonbridge, Ashford and Canterbury. There are indications that there may have been a bay on the down platform for the Harbour branch train, but there is not sufficient clearance for vehicles of modern width, if such a bay ever existed.

Central and Shorncliffe Stations.

THE Central station has up and down platforms with a bay on the up side. This station is reached by long inclined passages from the public road. The down platform has been lengthened at the down end, and the top of the inclined passage has been altered. There is an approach road for vehicles on the down side, and a subway for passengers connects the two platforms. Shorncliffe station, about half a mile nearer London, has through and platform roads, but the up platform has been lengthened (or perhaps connected to the platform of an older station), so that up trains on the through road actually come alongside one end of this platform for some distance. If up stopping trains are short enough they pull up at the platform east of the spot where the platform line rejoins the up through road. There is a bay to the down platform, built for the Elham Valley trains. The down line of the branch, opened in 1887, runs for a mile alongside the main line on its north side. The branch trains now work through to and from Dover and beyond, so that the bay platform is not used for regular trains. Junctions for down branch and main-line trains have been put in at Cheriton Junction, where the Elham Valley line diverges from the main line, so that down main and branch trains can use either the main line or the branch between the station and junction. In view of the large permanent military camp at Shorncliffe, the station, goods sidings, &c., are on a fairly extensive scale.

The Harbour Branch.

THE working of the Harbour branch is interesting. The line is double throughout, and on a steep falling gradient throughout its length to the viaduct across the harbour; approaching the viaduct the line is on a sharp curve. Down trains for the branch diverge from the main line at the east end of the down platform at the Junction; the connection crosses the up main line and serves three reception roads, parallel with the main line. The reception roads extend as far as the mouth of the tunnel.

A "King Arthur" engine and a standard train of modern coaches fill one of the reception roads, and if there is an additional luggage van on the rear of the train, it stands on the locking bar of the points of the down branch, so that they cannot be shifted. The tank engine which is to take the train down to the pier, backs on, the van is uncoupled, and the engine takes it down the up branch line to a crossover. The branch points can then be shifted; the engine pushes the van over the crossover, and up the down line to the train, the van is re-coupled, and the train starts on its journey down the branch. On the land side of the viaduct across the harbour is a signal-box, controlling facing crossover roads in both directions. Down passenger trains make use of one and travel thence to the pier platform on the up road.

The Boulogne boat train generally runs in two or more parts, the last part followed five minutes later by the Flushing train. This means that the earlier trains have to be got out of the way to enable the Flushing train to run to the Dutch steamer berth at the end of the pier. Fairly extensive sidings are provided on the beach, and into these the empty Boulogne trains are backed. The empties of the principal boat train are often worked to Dover, to be utilised in up boat services from there. Similarly, the empties of an afternoon down Dover boat train work to Folkestone for the up service thence.

Harbour Branch Working.

THE working over the branch became much simplified many years ago, *i.e.*, since trains

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have been fitted with automatic continuous brakes. One of the 0-6-0 side tank engines brings a passenger train of any length and weight down the branch, controlling its passage by the vacuum brake. In the old days, when the trains were not half their present weight, there would be an engine—perhaps two—and two or more branch open brake trucks of a special type, at the head of the train, each with a brakesman to apply the hand brakes, whilst the guards, in the ordinary brake vans of the train, also applied their hand brakes. The journey in wet weather was more or less of an adventure, but even minor mishaps were very infrequent. Safety on the up journey was obtained by an engine at the head, with the branch brake trucks and one or two tank engines at the rear. Up trains still require an engine or engines at the head and one or two banking at rear. The new boat trains weigh about 340 tons empty, and speed up the branch does not exceed 6 to 8 m.p.h. When a strong wind blows up the branch, the exhaust from the engines' chimneys blows in the direction in which the train is travelling, instead of to the rear.

The Locomotives Employed.

THE branch engines are 0-6-0 side tanks designed by Mr. J. Stirling, and are mostly as built; all are domeless, with the safety valve on the centre of the boiler barrel, and all retain the cab, wings to smokebox, and other features of the Stirling regime, although some appear to have shorter chimneys, and boilers of slightly larger diameter. The engines are numbered 70, 125, 152, 153, 155, 336, 338, 339 and 342, of which five are usually in steam. They are shedded at Folkestone Junction. For shunting on the Harbour lines there are two small 0-6-0 side tanks, Nos. 555 and 558, one of which is in steam at a time, and shedded at the Harbour. The other is at the Junction shed. The bigger branch tank engines do the goods shunting and marshalling at the Junction station.

The branch goods trains, which are restricted in length, have one or more of the special branch 10-ton brake trucks attached; these trucks are vacuum fitted, as are also many of the goods vehicles, as most of the traffic is *grande vitesse*. Unless the up goods trains are very short and all vacuum fitted, an engine at rear is always employed.

Power Signalling at Folkestone.

THERE are two roads crossing the harbour branch on the level, necessitating gate keepers, as well as a footpath level crossing. Overbridges for pedestrians are provided at the road crossings. There are three signal boxes at the Harbour—one on the land side of the viaduct, another at the pier end of the old Harbour station, and the third between the first and second pier platforms. About three years ago, electric power signalling, on Sykes' system, was installed, and all the signalling is now concentrated at the centre box. At certain places along the pier are small ground frames, each actuating one or two sets of points, on the running roads. A telephone is installed at the frames and the shunter communicates by 'phone with the signalman, who, if conditions allow, releases the points, which the shunter then manipulates. Power to work the point motors, and also for the capstans on the quays, is supplied from the Folkestone Corporation Electricity Works. The points on the pier and quay used for shunting the wagons are hand-operated by the shunters. The signals facing seaward on the pier, harbour and approach lines—*i.e.*, those controlling up trains, all show a blue light for danger, as any red lights might be mistaken for navigation lights by vessels. When "off" the signals display the conventional "green."

Railway as Castle Owner.

THE multitudinous activities and ramifications of railways give them a finger in numerous pies. To own a ruined castle, and to obtain income from fees paid by holiday makers who visit the remains of a bygone military stronghold, must, however, be something of a novelty. The Southern Railway owns the ruins of Sandgate Castle, Kent, which during the summer is visited by many pleasure seekers, who pay 3d. a head for the privilege. The castle is on the seashore, and was built by Henry VIII in 1539, at a time when there were no houses between Hythe and Folkestone; only the interior circular keep of the castle now remains within the walls. In 1874 the branch railway from the South Eastern main line, at Sandling Junction, where there was then no station, was opened to Sandgate. The line was double, the station being at Seabrook, at the Hythe end of Sandgate. The South Eastern Railway purchased a big estate here, built a sea wall, and constructed a tramway along it, and on its continuation, the public road, to Sandgate. This horse tramway was operated by the railway until three years ago. The lines have now been taken up, and the sea wall is being demolished by the heavy seas that break over it when the wind is from the S., S.E. or S.W.

The railway being opened to Sandgate, it was soon proposed to extend it about three miles to Folkestone Harbour, apparently along the shore. This would have provided a slightly shorter route for the Continental

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trains, and in addition, they would not have to reverse at Folkestone Junction, so that the trains would have been at the Harbour station about 80 minutes after leaving London, compared with 105 minutes by the competitive London, Chatham and Dover Railway service to Dover. Parliamentary sanction was obtained for the line from Sandgate to Folkestone Harbour, and much of the land, including Sandgate Castle, was bought by the railway. Luckily for the railway shareholders and for Folkestone (the sea front of which would have been entirely spoilt by the railway), wiser councils prevailed amongst the directors, and finally the projected line was abandoned, leaving the railway with various properties on its route, one of which is the ruins of Sandgate Castle—now run as a small "side show."

Locomotive Work on the Northern Railway of France.

In view of references made last month by Mr. Allen to the work of compound locomotives on the Northern Railway of France, Mr. J. P. Pearson, whose writings on locomotive practice and performance were well known some thirty years ago, sends some remarks as to records obtained by him during September last. Actually, he made 60 runs, with results which he describes as "so remarkable that, on their intrinsic merits, coupled with the fact that they throw a good deal of light on the subject of faster express trains recently brought forward by Lord Monkswell," he regards them as probably worthy of publication. He describes his experiences thus:

"Of the 60 runs, ten were made on the 10 a.m. and 12 noon out of Paris to Calais—these trains representing, on account of their great weight, the 'cream' of Nord work. Each is allowed 110 minutes to the water stop at Abbeville (108·92 miles), and out of this has to come the very prolonged slack at Amiens (a slack, in its effects, quite as serious as that at Peterboro'). My runs on this length, with gross loads behind the tender ranging from 495 to 513 tons, were all, allowing for a most severe permanent-way slack at Boves, done under the booked time of 110 minutes. One run only escaped this Boves slack, and on that occasion we were in Abbeville in 108 min. 26 sec., despite a run in from Pont-Remy to Abbeville some 50 sec. slower than usual, and this with one engine and 513 tons. Gannes (54·21 miles out from Paris, including the ascent to Survilliers on a grade of 1 in 200 more than half as long again as our L.N.E. bank ending at Potter's Bar, and including a rise from Criel to Gannes very similar to the L.M.S. rise to Tring) took, on my best run, 55 min. 20 sec. with 510 tons, and, on my worst, 56 min. 53 sec. with 499 tons.

Further Details of Running.

Continuing from Abbeville to Calais, the 75·64 miles have an allowance of 82 min.—slower than the Paris to Abbeville timing, but then here we have the more severe Dannes-Camiers and Caffiers banks. The latter of these resembles the Clifton to Shap rise on the L.M.S. and must be a terrible nut to crack for trains of 500 tons. Yet my best start-to-stop run over this 75·64 miles only required 76 min. 44 sec. (510 tons) and my worst, 81 min. 40 sec. (496 tons). The run in to Calais (Maritime) is rather slow. One day, though not travelling by it, I saw this 3¼ hours train arrive at Calais half a minute early with a gross load behind the tender of no less than 550 tons. With these enormous trains we generally topped the long Survilliers 1 in 200 bank in kilometres at 41 and 42 sec. each (65 to 67 sec. per mile), while at the top of the long 1 in 125 to Caffiers, 54 to 56 sec. (86 to 90 seconds per mile) was about our best. With a lighter load of 371 tons we one night ran from post 17 to 24 on the Survilliers ascent (4.35 miles at 1 in 200) in 4 min. 20 sec., or at just over the 60 m.p.h. rate. This was with a Lille express, which was checked after post 24, where speed was slightly increasing. Train weights were arrived at by taking off the weight of each coach, totalling them, and adding the moderate figure of 7 per cent. to this to obtain the 'gross' weight. As practically all seats were occupied and luggage bulky, this addition of 7 per cent. is probably an understatement."

Rye Harbour Railway.

When in 1851 the South Eastern Railway opened its branch to Hastings from Ashford, the ancient Cinque Port of Rye had for several hundred years been about a couple of miles from the sea. It had, however, managed to retain some trade by the small coasting ships then common. These discharged at the mouth of the tidal river, the course thence to the town quay being extremely tortuous. In the belief that this shipping traffic would prove remunerative, the S.E.R. constructed a single-line branch, about 1¾ miles in length, to Rye Harbour. This goods line leaves the main line about one-third of a mile south of Rye station by means of a trailing junction with the down line. There is a ground frame at the junction. About a quarter of a mile along the branch is a siding for a mineral oil firm, and a mile further is the siding of the Rye

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Chemical Company, to which tar for treatment and fuel are conveyed. The branch terminates on a wharf about 55 yards in length, the rails joining at an angle of about 45 degrees by means of a turntable, which connects with the rails on the 10 yards at the south end of the wharf, there being no rails on the 40 yards north of the turntable. The silting of the river mouth and the decay of the trade formerly done at Rye Harbour have caused the complete disappearance of the trade for which the goods branch was constructed, but there is a small traffic of a curious nature on the branch.

"Trugging."

CERTAIN stones on the Dungeness shingle bank are used in making crockery ware. Boats go at high tide to the bank; a plank is placed from the bank to the boat, and by means of a yoke on each end of which is a Sussex "trug," a man loads the boat with about 1½ tons of the particular shingle. Fourteen yoke-loads, each of two "trugs," are equal to a ton, so that about 21 journeys are made between the shingle bank and the boat. One man carries the yoke, whilst his mate loads up another pair of "trugs," the empty one being exchanged for the full. The boat then returns to Rye Harbour, where these big dark grey pebbles are unloaded in a similar manner on the river bank alongside the railway. Some half dozen pairs of men are employed in the business. When any pair obtains an order from the Potteries for shingle, open wagons are requisitioned, and the pebbles loaded in them by a man carrying the "trugs" on a yoke from the heap to the truck, exactly as the boat was loaded at the shingle bank, the trucks holding 8 to 10 tons. There is a short length of double line near the wharf end of the railway, which enables the loaded and unloaded wagons to be exchanged; on the loaded line is a wagon weighbridge. A development has been made in the business: a firm competitive with the boatmen (who also are competitive with each other) has laid down a narrow-gauge light railway from the land side of the shingle bank to a point on the railway about ¼ mile from the wharf end of the branch, and the pebbles from the narrow gauge trucks are transferred to the ordinary wagons at this point.

The loading of railway wagons, by men carrying the material in "trugs" suspended from a yoke, must surely be the most primitive method in existence. If the Kentish coalfields develop, it may be found more convenient to erect kilns at Rye Harbour, and bring the coal, as well as china clay, to the pebbles, and there make the crockery rather than transport the stones some 200 miles to the potteries. A daily train up and down the branch is quite sufficient for the oil, pebble, and chemical traffic.

L.M.S.R. Mystery Branches.

TRAVELLERS to and from London by both main lines of the L.M.S.R. see on each a separate unused railway, which excites curiosity. On the London and North Western section the line is at Boxmoor; and on the Midland section at Napsbury, about 1½ miles South of St. Albans. From time to time information relative to these lines has appeared in the RAILWAY MAGAZINE. Mr. F. J. Climpson has written us on the subject, and for the benefit of recent readers we give some particulars of these two railways. The one at Boxmoor is an extension of the Hemel Hempsted branch of the Midland Railway. In 1863 the Hemel Hempsted and London and North Western Railway Company was incorporated to construct a line from the L. & N.W.R. at Boxmoor through Hemel Hempsted, to the Hertford, Luton and Dunstable Railway near Harpenden, but the Midland Railway having obtained powers to construct an extension to London from Bedford, the Hemel Hempsted Railway obtained an amending Act, enabling it to connect with the Midland Railway instead of the H.L. and D.R. The line, as completed, joined the Midland Railway about 1¼ miles north of Harpenden, the junction being facing for up trains so that the local trains ran to and from Luton. The Midland Railway worked the line from Hemel Hempsted upon its opening in 1877 till 1886, when it absorbed it. A new spur was made joining the Midland Railway by a facing junction for down trains, and the local trains have since run to and from Harpenden. The rails have been taken up on the spur of the old junction, but the deep cutting remains, and there is a wild delta, enclosed by the main line, branch and abandoned spur.

Hemel Hempsted and Boxmoor Line.

HEMEL HEMPSTED is about 1½ miles from the L. & N.W.R. at Boxmoor Station. The Midland Railway did not work the section between Hemel Hempsted and the L. & N.W.R. at Boxmoor, as the London—Hemel Hempsted traffic would have been diverted to the shorter route *via* Boxmoor. As the Midland worked, and later owned the line, the L. & N.W.R. could do nothing. Mr. Climpson had gathered some romantic gossip about the line at Boxmoor which shows how railway "history" is made. He says "The line was constructed across Boxmoor, which as the name implies is a 'Protected Common'

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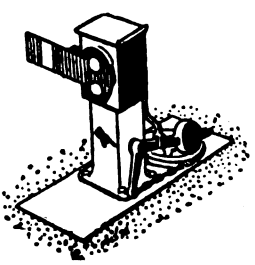
which is upheld by a trust of some considerable wealth. At Boxmoor end the metals were never actually connected, although the cutting was made, all prepared and ready. The then rival companies ignored the owner and his project for a matter of thirty years. The 'Boxmoor Trust' who eventually claimed it, tried to lease it to the Midland, but without success. At the Boxmoor end a gas works has claimed the terminal for a private siding. At Cotterells, midway between the two lines, was constructed an extensive goods yard and warehouse siding; this was used owing to the easy loading facilities compared with Hemel Hempsted, users paying a toll or wayleave to the Trust Authorities. In pre-war days the railway bank and points, signals, etc., were a happy hunting ground for the children—metal and sleepers all left intact though. One would have thought, now the amalgamation has had effect about two years, that the L.M.S.R. would have utilised this part of the system as the district contains various manufacturing concerns (several big paper mills at Nash Mills, Boxmoor and Hemel Hempsted), but the 'Local Worthy' responsible for this line died penniless in the workhouse." As we have shown, the line throughout belonged since 1887 to the Midland Railway, and for several years it has worked trains to Heath Park Halt, 71 chains beyond Hemel Hempsted, towards Boxmoor. The L. & N.W.R. 'buses from Boxmoor Station were a competitive service.

The other dismantled line joining the Midland main line, is about 1½ miles long, and commences by a junction with the late L. & N.W. Railway's St. Albans branch, south of Park Street Station, crossing the Watling Street by a brick overbridge, and joining the late Midland Railway in the down direction, at the spot where Napsbury station was built about 25 years ago. This line was constructed in the early "sixties" by the contractor for the London extension of the Midland Railway, to enable him easily to bring materials and plant on to the site of the line he was building for the Midland Railway.

Waterford and Tramore Railway.

Mr. G. D. Crawfurd sends the following notes in regard to the Waterford and Tramore Railway:—"This line (7¼ miles long) has no other stations than the two termini. Both these stations have one platform, which, with the adjacent tracks, is roofed over. There are four locomotives. No. 1 is a 2-2-2T which was re-boilered at Manor Street Works last year. No. 2 is also a 2-2-2T, and is being re-boilered. No. 3 is a 0-4-2T built in 1893, and No. 4 is a 0-4-2T built by Barclay, of Kilmarnock, in 1906. All these engines have tanks below their boilers, but side tanks are being sent for them from Inchicore. The engines are coloured green, with brass domes and fittings. There are 20 coaching vehicles, of which the first-class are coloured blue, and the third-class and brake vans Indian red. There are nine first-class carriages, of which three are four-wheeled and five six-wheeled. There are six six-wheeled third-class coaches, two four-wheeled ones, and three six-wheeled third-class brakes. One engine and a train of five coaches suffice to work the daily service. The train consists of two firsts, a third brake and two thirds (all six-wheelers). Last January No. 3 was the engine. At Easter No. 1 was on duty. The locomotive shops are at Manor Street station, Waterford, and consist of one building, which contains a running shed (for the locomotive on duty), an erecting shop (where, incidentally, the remaining three locomotives are kept), and a machine shop, which contains a gas engine, a plane, a lathe, and a punching machine. The third-class carriages have wooden seats with no cushions. The first-class carriages are, however, more comfortable. The carriages are coupled by means of a hook and chain, and there is no brake. There are at present 11 trains in each direction and eight on Sundays. The time taken is 17 minutes, representing an average of almost 25·6 m.p.h. As the line is not connected with other railways, there is little goods traffic, but there is a large suburban passenger traffic all the same."



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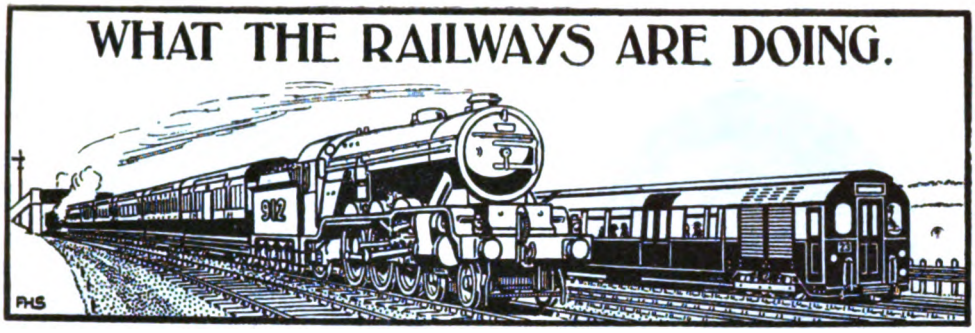
WHAT THE RAILWAYS ARE DOING.



INVESTITURES were held at Buckingham Palace on February 4 and 5, when The King invested the following gentlemen with the Insignia of the respective Divisions of the Orders into which they have been admitted :

G.C.B. (Military Division).—General the Hon. Sir Herbert Lawrence.

C.M.G.—Lieut.-Colonel Woodbine Parish.

C.B.E.—Mr. Albert Bolter ; Mr. Robert Irwin ; Major Gilbert Szlumper.

O.B.E.—Mr. Arthur Allen ; Mr. Frederick Brant ; Mr. Ashton Davies ; Mr. Elias Ford ; Mr. Edward Lowther ; Mr. William Maclure ; Mr. Samuel Murgatroyd.

M.B.E.—Mr. Irving Beeby ; Mr. William Bramwell ; Mr. John Evans ; Mr. George Flewellen ; Mr. Alfred Hoyle ; Mr. Eustace Missenden ; Mr. James Page ; Mr. Arthur Richardson ; Mr. Alexander Sandilands ; Mr. Robert Scorgie ; Mr. John T. Scott ; Mr. Thomas Travers ; Mr. Thomas Wenlock.

* * *

SIR GUY GRANET, Chairman, L.M.S.R., has been re-elected Chairman, and Mr. William Whitelaw, Chairman, L.N.E.R., Deputy Chairman, for the ensuing year, of the Railway Companies' Association.

* * *

AT a meeting of the Board of the Great Northern Railway Company of Ireland, held on January 26, Sir George Smith Clark, Bart., D.L., was elected Chairman of the Company in succession to the late Mr. William P. Cairnes. Mr. William Burton Carson, Dublin, was elected Deputy Chairman ; and Mr. R. Stanley Stokes, F.C.A., Dublin, was co-opted a Director in place of the late Mr. William P. Cairnes.

* * *

MR. CHARLES MATHEW STEDMAN, who has been appointed Assistant Locomotive Running Superintendent, North Eastern Area, L.N.E.R., has, since the formation of the L.N.E.R., held the position of Assistant Locomotive Running Superintendent of the Southern Area, comprising the Great Central, Great Eastern and Great Northern sections. Mr. Stedman entered Great Eastern Railway service in August, 1900, as a premium apprentice under the late Mr. James Holden, then Locomotive Superintendent. At Stratford Mr. Stedman served in various shops and departments, at the same time studying at technical colleges and obtaining certificates for proficiency in matters relating to engineering, including electricity, also obtaining premier awards for machine design. On completing his apprenticeship he spent some years in the drawing office, after which he was appointed Locomotive Inspector, serving in this capacity for four years during which period he took charge of most of the locomotive districts during the temporary absence of the District Locomotive Superintendents. He was subsequently placed in charge at Parkeston, and was afterwards transferred to Norwich as Assistant District Locomotive Superintendent. In

MR. C. M. STEDMAN,

Assistant Locomotive Running Superintendent, North Eastern Area, L.N.E.R.

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Photo.] **MR. P. SYDER,** [*Miles & Kaye.*

Appointed London City Manager, L.N.E.R.

MR. R. A. NEWMAN,

Appointed Suburban District Goods Manager, London, L.N.E.R.

MR. C. G. DANDRIDGE,

Appointed London District Passenger Manager, L.N.E.R.

CAPTAIN R. DAVIS,

Appointed Marine Superintendent at Parkeston Quay, Harwich, L.N.E.R.

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1914 he was appointed by Sir Henry Thornton a member of special re-organisation committees then instituted, and in the following year became Chief Assistant to Mr. F. V. Russell, then Superintendent of Operation. This department, as a result of reorganisation, was given control of all matters appertaining to the movement of traffic, including locomotive running. During the six years spent in this capacity Mr. Stedman was associated with many of the notable developments inaugurated by Mr. Russell. In 1923 Mr. Stedman became Assistant Locomotive Running Superintendent, Southern Area, L.N.E.R., as above mentioned. He is a Foundation Member of the Institute of Transport and a Member of Council of the Institution of Locomotive Engineers.

MR. R. HALLIDAY,

Appointed Assistant to the Secretary, Great Western Railway.

MR. N. P. MANSFIELD, M.B.E.,

Appointed Stationmaster at Paddington, Great Western Railway.

* * *

We are officially informed that Mr. L. Brightman, London District Manager, London & North Eastern Railway (Great Northern Section), retired from the service on January 31, and that the company have taken this opportunity of carrying out a complete reorganisation of their commercial arrangements in the London area.

The post held by Mr. Brightman, together with the positions of Divisional Commercial Superintendent at Liverpool Street, and District Goods Manager at Marylebone, cease to exist and the following posts have been established :—

(1) A "London City Manager," with headquarters at Broad Street, E.C., who takes control of the goods commercial work (except claims and cartage) over a district approximately corresponding to the Metropolitan Conference area (comprising the London goods stations and certain inner suburban depots, together with the whole of the district south thereof). In addition, the London City Manager takes over the passenger commercial work, as regards the control of receiving offices and canvassing for parcels traffic in inner London.

(2) A "Suburban District Goods Manager," with headquarters at King's Cross, who, with certain local adjustments, takes control of those stations and depots outside the Metropolitan Conference area which are supervised by the existing London district officers.

(3) A "London District Passenger Manager," with headquarters at Hamilton House, Bishopsgate, who is responsible for the passenger commercial work at King's Cross, Liverpool Street and Marylebone, and for an area covering the suburban and outer suburban districts of the three sections of line radiating from these stations.

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We are also informed that in connection with this reorganisation the directors have made the following appointments:—

Mr. P. Syder, Divisional Commercial Superintendent, Liverpool Street, to be London City Manager.

Mr. R. A. Newman, Assistant to the Goods Manager, Southern Area, to be Suburban District Goods Manager.

Mr. C. G. Dandridge, District Passenger Manager, Manchester, to be London District Passenger Manager.

* * *

Mr. Percy Syder, who has been appointed London City Manager, L.N.E.R., was born at Fakenham, Norfolk, in 1879, receiving his education at the Norwich Commercial School. He entered the service of the G.E.R. in the Good's Manager's Rates Office in 1896, and was appointed South Country Canvasser in 1900, three years later becoming Outdoor Assistant to the Mineral Manager and Chief Representative on the London Coal Exchange, in which capacity he had to meet and deal with all the large firms connected with the London coal trade. In 1911 Mr. Syder was appointed Chief Canvasser, and two years later Chief Commercial Agent, his duties in this connection including the supervision of G.E.R. Agencies in the North, Midlands and Scotland, in addition to attending the London Coal, Wool and Corn Exchanges. In 1915 Mr. Syder relinquished this position to take up the appointment of District Goods Manager at Ipswich, and while in that town was elected a member of the Town Council and served on the Committee of the Chamber of Commerce. Mr. Syder was subsequently transferred to London as Divisional Commercial Superintendent in 1917. Consequent on the shortage of rolling-stock following the war period, the directors in 1920 appointed Mr. Syder to take charge of all matters relating to the manipulation of full and empty wagons, this including repairs to crippled stock, being directly responsible to the General Manager, Sir Henry W. Thornton. He has always shown great interest in the welfare of the staff, and is a keen sportsman, being instrumental in forming the Great Eastern Golfing Society in 1920. Mr. Syder is Deputy-Chairman of the Committee of the London & North Eastern Railway Musical Society, and is at present Chairman of the Railway Companies' side of the Traders' Traffic Conference, London Panel. He was one of the Foundation Members of the Institute of Transport. His new headquarters are at Bread Street, London, E.C

Mr. R. A. Newman, who has been appointed Suburban District Goods Manager, London, L.N.E.R., became in July, 1923, Assistant to the Goods Manager, Southern Area, London & North Eastern Railway. He had previously held the position of Outdoor Assistant to the Commercial Superintendent, Great Eastern Railway. Mr. Newman entered Great Eastern service in 1884 as a probationary clerk in the booking office at Harwich. Subsequently he became Goods Clerk at Brightlingsea, General Clerk at Dovercourt and Elmswell, and Goods Clerk at Southminster. In January, 1893, he was transferred to the Ledger Accounts Section of the Goods Manager's Headquarters Offices at Liverpool Street Station, and twelve months later to the Rates Office and subsequently to the General Office of the Department. In 1914 Mr. Newman was attached to the Chief Goods Manager's personal staff for special duties and general organisation work at headquarters and stations, and in January, 1920, became Outdoor Assistant to the Commercial Superintendent as above mentioned. Mr. Newman was associated with a number of special developments affecting his department under the G.E.R., and lectured to the junior clerical staff upon station working. For the past two years he has acted as examiner in the clerical examination papers of the Southern Area in respect of Goods Office Work and Accounts. He is a member of the Institute of Transport.

* * * *

Mr. C. G. Dandridge, who has been appointed London District Passenger Manager, L.N.E.R., has, since August 1, 1923, held the position of District Passenger Manager, Manchester. Mr. Dandridge commenced his railway career in the General Manager's Office of the Great Central Railway. He subsequently obtained experience in various sections of the operating and commercial departments, and was also for a time on the staff of the Locomotive Running Superintendent, the Stores Superintendent and the Portmaster. During the War Mr Dandridge served as a Traffic Officer, and subsequently as D.A.D.R.T. with the British Army in France, while in 1919 he was appointed to take charge of the Archangel Northern Railway (Russia), with the rank of Major, R.E. He afterwards served as D.A.D.R.T. with the Railway Mission in South Russia, and there gained experience of the working of the Russian railways under quite abnormal conditions. When the Railway Mission terminated he was appointed District Traffic Manager of the Anatolian Railway, Turkey. On his

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return to England Mr. Dandridge was appointed Assistant District Traffic Manager, Great Central Railway, Manchester, becoming District Passenger Manager at Manchester, L.N.E.R., on August 1, 1923, as above mentioned.

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CAPTAIN R. DAVIS, who has been appointed Marine Superintendent at Parkeston Quay, Harwich, L.N.E.R., obtained his early sea service under sail, and was afterwards employed with the Bucknall Steamship Lines, and later the Ellerman & Bucknall Steamship Company. In 1916 Captain Davis received a commission in the Royal Engineers, and was stationed at Richborough, where he was associated with cross-Channel war transport and with the train-ferries which plied from Richborough and Southampton. At the armistice, he held the rank of Staff Captain, and was Assistant Marine Superintendent at the War Office for craft operated by the inland water transport section of the R.E. When the port of Richborough passed from military control, he took charge on behalf of the Ministry of Munitions, remaining until the property passed into private ownership. In 1923 he was appointed Marine Superintendent to Great Eastern Train Ferries Limited; when that company was formed to operate regular train-ferry services between Harwich and Zeebrugge, later also taking over the duties of Secretary to that company.

* * *

WE are officially informed that the Directors of the Great Western Railway have authorised the following appointments:

Mr. R. Halliday, Chief Clerk, Secretary's Office, to be Assistant to Secretary.

Mr. W. U. King, Clerk, Secretary's Office, to be Chief Clerk, Secretary's Office.

Mr. A. C. D'Albertanson, Chief Clerk, Finance Office, to be Assistant Cashier, Paddington.

Mr. N. P. Mansfield, Stationmaster, Reading, to be Stationmaster, Paddington.

Mr. A. P. Watkins, Stationmaster, Taunton, to be Stationmaster, Reading.

Mr. T. Blea, Stationmaster, Acton, to be Stationmaster, Fishguard Harbour.

* * *

MR. R. HALLIDAY, who has been appointed Assistant to the Secretary, G.W.R., entered the service in the Deeds Office at Paddington in February, 1887, and was transferred to the Secretary's Office in July, 1892, being appointed Chief Clerk as from March 1 last. Mr. Halliday has for some time held the position of Treasurer of the G.W.R. Provident Society, and of the G.W.R. Staff Friendly Society. He is well known for his extensive knowledge of Great Western history.

* * *

MR. N. P. MANSFIELD, M.B.E., who has been appointed Stationmaster at Paddington, entered G.W.R. service in the staff section of the Divisional Superintendent's Office at Swansea in April, 1886, and three years later was transferred to the General Manager's Office at Paddington. In March, 1891, Mr. Mansfield returned to the Swansea Division in the capacity of relief clerk, and on the opening of the new Fishguard and Rosslare route to Ireland was appointed Night Stationmaster at Fishguard Harbour. Four years later he was promoted to the position of Station and Quay Superintendent, and in August, 1922, removed to Swansea as Chief Clerk to the Divisional Superintendent there. Two years later he went to Reading to fill the post of Stationmaster.

* * *

MR. D. V. LEVIEN, Secretary's Office, Great Western Railway, Paddington, has been appointed Secretary to the London Midland & Scottish and Great Western Joint Committee, in succession to Mr. F. R. E. Davis.

* * *

MR. F. C. HOCKERIDGE, formerly Chief Clerk, Secretary's Office, Taff Vale Railway, has been appointed Secretary to the Fishguard and Rosslare Railways and Harbour Company.

* * *

THE following L.M.S.R. appointments have recently been made:—

Mr. J. M. R. J. Irwin to be District Traffic Superintendent, Swansea, *vice* Mr. A. Walker, retired.

Mr. W. Davies, of Manchester, to be District Controller, Wakefield.

Mr. P. Turner, of Bolton, to be Assistant Divisional Controller (Freight Services), Manchester.

Mr. H. Morgan to succeed Mr. Taylor as Stationmaster at Holyhead.

Mr. J. W. Clarke, St. Pancras Goods Station, London, to be responsible for Somers Town as well.

Mr. F. T. York to succeed Mr. Cowern as Goods Agent at Wednesbury.

Mr. W. A. Wooding to be Goods Agent at Cardiff, *vice* Mr. E. Overend.

Mr. A. Moss to be L.M.S. Goods Agent at Warrington.

Mr. W. E. Edwards to be L.M.S. Goods Agent at Northampton.

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Mr. C. Turner, District Agent at West Hartlepool, transferred to a similar position at Newcastle.

Mr. B. G. Lindeman to succeed Mr. H. Cope as Chief Canvasser, London.

Mr. A. Trotter to be Goods Agent, Wishaw.

Mr. J. Alcorn to be Goods Agent, Ayr.

Mr. J. Deas, Stationmaster, Forres, to be Goods Agent, Inverness.

Mr. D. Cameron, Goods Agent, Inverness, to be District Traffic Agent, Inverness.

* * *

WE are officially informed that Mr. M. Bedford, Divisional Superintendent of Operation, Ipswich, L.N.E.R., will retire from the service on February 28. The position of Divisional Superintendent of Operation at Ipswich has been abolished, and the operating work which he has supervised has been allocated between the officers in charge of the three contiguous districts, as under :—

Mr S. G. Randall, District Superintendent, Stratford.

Mr. J. B. Rogers, District Superintendent, Cambridge.

Mr. H. W. C. Drury, District Superintendent, Norwich.

* * *

MR. WILLIAM BRADSHAW, who died on January 26, in his 81st year, was the second son of George Bradshaw, the founder of *Bradshaw's Guide*. His elder brother, Mr. Christopher Bradshaw, is still alive. Mr. William Bradshaw was a director of the firm of Henry Blacklock & Co. Ltd., who issue the publications bearing his name.

* * *

MR. REGINALD PETERS, A.C.G.I., Assoc. M.Inst.C.E., appointed District Engineer, Northern Scottish Area, Aberdeen, L.N.E.R., was educated at Sedburgh and the Central Technical College in London. In 1904 he was articled to Mr. W. J. Cudworth, then Chief Engineer of the late North Eastern Railway. Some two years later he obtained a position as Engineer's Assistant on the Metropolitan District Railway, returning, however, in 1907 to the Chief Engineer's office of the North Eastern Railway at York. In 1910 he became Chief Assistant to the District Engineer at Darlington. In 1916 he was attached to the R.E. training depot, Newark, and a few months later transferred to Railway Construction Troops, with whom he served for over two years in France.

* * *

MR. R. H. SELBIE, C.B.E., Director and General Manager, Metropolitan Railway, has accepted the Chairmanship of the Board of Management of the Railway Benevolent Institution for 1926, in succession to Sir Ralph L. Wedgwood, C.B., C.M.G., Chief General Manager, London & North Eastern Railway.

* * *

ARRANGEMENTS have been made for the sixty-eighth anniversary dinner of the Railway Benevolent Institution, to be held on Thursday, May 6, 1926, at the Hamilton Hall of the Great Eastern Hotel, Liverpool Street Station, when Brig.-General the Hon. Everard Baring, C.V.O., C.B.E., President for this year, will preside.

* * *

MR. HUGH MCINTOSH, who has been appointed Locomotive Running Superintendent, Great Northern Railway of Ireland, held the position of Works Manager in the Locomotive, Carriage and Wagon Department of the same railway, at Dundalk, from 1919 until taking over his present duties in October, 1925. Mr. McIntosh joined Great Northern Railway service at Dundalk Works as an apprentice in March, 1900. After obtaining experience in various departments he was appointed District Locomotive Superintendent at Belfast in 1908, holding that position until going to Dundalk as Works Manager in 1919, as above mentioned.

* * *

THE death was announced recently of Mr. Adam Brown. Mr. Brown was born in Edinburgh in 1826, but went to Canada at an early age. He was associated with many historic developments on the Canadian Pacific Railway. One of his sons is Sir George McLaren Brown, European General Manager, C.P.R.

* * *

SIR CHARLES CHEERS WAKEFIELD, Bart., C.B.E., has consented to preside at the 65th anniversary festival in aid of the funds of the United Kingdom Railway Officers' and Servants' Association. It is to be held at the Trocadero on Wednesday, April 21 next.

* * *

A TEMPORARY scheme of railway extensions and improvements in the Frodingham area was completed in April, 1925, but, owing to opposition, a larger and more permanent scheme was abandoned by the L.N.E.R. until a later date. Parliamentary powers for some of the improvements were necessary and these have now been obtained. The L.N.E.R. directors have decided to proceed forthwith with the scheme of improvements, which includes the removal of the existing

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passenger station at Frodingham to a site a short distance to the west, where an entirely new station will be constructed, the altered position being more convenient for the residential population; a large marshalling yard with 20 sorting sidings and a capacity for dealing with about 2,000 wagons, with shunting spurs; an enlarged goods and coal yard with new warehouses; a diversion of a public road with the construction of a new bridge over the line, to enable a level crossing east of the present station to be abolished; and a new western curve between the L.N.E.R. main line and the North Lindsey Light Railway.

* * *

At a meeting of the L.N.E.R. (London) Lecture and Debating Society, on January 28, Mr. H. F. Hilton, M.Inst.T., read a paper upon "The Evolution of the Rail Motor-Car and its Uses." Mr. Hilton dealt with the close relation of road vehicles and rail motor trains, the building impetus of 1905, the designs evolved and survival and subsequent uses. He also spoke of the advantages and defects of the rail motor, its latest evolution, direct and indirect economies derived from their use, and the outlook upon their future employment. The chair was occupied by Mr. T. Smith (Asst. Supt., Southern Area), who was supported by Messrs. A. Burton and H. W. C. Drury (Vice-Presidents).

* * *

Tests have been carried out from one of the G.W.R. Channel Islands steamers with wireless telephonic apparatus designed for establishing communication between sea and land without the aid of either aerial or earth connections. The inventor is Mr. D. S. B. Shannon, of Sutton Coldfield, near Birmingham, and the trials were conducted between a private residence in Guernsey, the G.W.R. agent's office in the island, and the G.W.R. steamer *Reindeer*, on the way from the Channel Islands to Weymouth. Messages could be clearly heard at distances varying from 10 to 70 miles, while the G.W.R. wireless operator was able to transmit messages from the ship's own plant without interfering with simultaneous transmission by the special installation.

* * *

The results of the terminal examination held in connection with the L.M.S.R. special scheme of education for railway clerks for the 1924-25 session have been issued. They show that 510 students—nearly one-third of the number examined—gained over 80 per cent. of possible marks. Less than one-tenth failed to gain the 50 per cent. necessary to qualify for a pass. Students were examined in economic geography, English, book-keeping, and special subjects relating to railway clerical work.

* * *

An agreement has been sanctioned by which the Dublin Borough Commissioners have authorised the taking over by the Dublin United Tramways of the Dublin & Lucan Electric Railway, and for the reconstruction of the track of the latter to correspond with the methods adopted in the city.

* * *

Recently, drawn by a G.C. type, 4-cylinder 4-6-0 locomotive, the Harrogate-Leeds-London Pullman train, after being delayed by signals between Doncaster and Retford, is reported to have covered the 139 miles from Retford to King's Cross in 135 minutes, thus achieving a punctual arrival.

* * *

Presumably in view of the activities of card-sharpers on trains in the Birmingham and Wolverhampton district, the L.M.S.R. is exhibiting posters at stations with the warning "Beware of Card Sharpers."

* * *

Kitson & Co., Ltd., engineers of Airedale Foundry, Leeds, have received an order for four Kitson-Meyer 2-6-6-2 articulated locomotives, for the Girardot Railway of Colombia.

* * *

Sir Davison Dalziel, Bart., M.P., President of the Compagnie Internationale des Wagons-Lits, has placed with the Leeds Forge Co., Ltd., of Leeds, the constructors of the original "Blue Train," an order for 30 all-steel Pullman cars for use on the Continent.

* * *

The London & North Eastern Railway have placed orders for 33,000 tons of steel rails with the following firms:—W. Beardmore & Co., Ltd.; Steel Company of Scotland, Limited; Barrow Hematite Steel Co., Ltd.; Cargo Fleet Iron Co., Ltd.; Bolckow, Vaughan & Co., Ltd.; Cammell Laird & Co., Ltd.; Steel, Peech & Tozer Limited; S. Fox & Co., Ltd.; and the Partington Iron & Steel Co., Ltd.

* * *

On Tuesday, January 26, at the Congregational Church, Wolverton, Mr. J. F. Gairns, Editor of The Railway Magazine, gave a lantern lecture reviewing interesting aspects of locomotive and railway development during the past 100 years. There was a good attendance, including many from the L.M.S. Carriage and Wagon Works at Wolverton.

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OWING to the increase in the fruit and vegetable traffic, particularly from the South Lincolnshire area, the L.N.E.R. have decided to extend the goods accommodation at Spalding by the provision of a new siding at a cost of £4,000. It is expected that the work will be completed in time for the coming season.

* * *

MESSRS. BASSETT-LOWKE, LIMITED, have placed on view at their London Branch, 112, High Holborn, a 1½-in. scale model of an L.M.S. 4-4-0 locomotive of the "George the Fifth" class. This model has been made throughout at their Northampton Works, and has been added to the series of standard garden type models for 7¼ in gauge. The model is finished in the new standard colours and lettering of the L.M.S.R.

* * *

THE "Underground" have been carrying out experiments with a higher speed lift at Leicester Square tube station. The increase in speed has been from 180 ft. to 290 ft. per minute, and tests taken have revealed a saving to passengers of 11 seconds in the journey between top and bottom landings. This increase in speed—about 30 per cent.—enables a closer-interval lift service to be given. It has been decided to provide all the lifts at Leicester Square with this improved equipment. A similar scheme is to be carried out at Holborn, "Piccadilly" line, where there are four lifts, the shafting being 126 ft. deep.

* * *

A TRAFFIC return issued by the L.N.E.R. compares the total of loaded trucks and tonnage carried by the Harwich-Zeebrugge Train Ferry during the last quarter of 1925 with the corresponding period of 1924. For 1925 the number of trucks in the quarter was 3,240, and the tonnage 30,943; compared with 1,418 trucks and a tonnage of 9,730 in the corresponding period of the previous year.

* * *

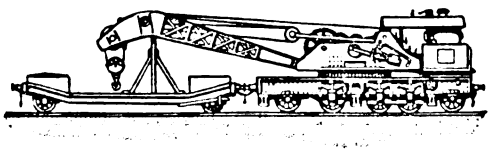
IT is reported that a syndicate has been formed in Newcastle, County Down, Ireland, with a view to raising the necessary capital for the construction of an electric railway to the top of Slieve Donard, 2,976 ft. above sea level.

* * *

MARCH Fixtures for the Wimbledon and District Model Railway Club are: March 1, 7.30 p.m., Red Cross Hall, Church Road. Lecture: "Continuous Brakes," by Mr. Thorpe (Westinghouse Brake Company). March 6, 7.45 p.m., Whist Drive, "Seymour's Café," The Broadway, Wimbledon (Tickets, 1s. 6d. from the Hon. Secretary). March 15, 7.30 p.m., Red Cross Hall; Test Track night and demonstration of samples the Hon. Secretary has received. March 27, Visit to Old Oak Carriage Sheds, G.W.R. Meet at the Jubilee Clock, Willesden, 2.45 p.m. ('Bus from Wimbledon, change at Putney). Prospective members should apply to the Hon. Secretary, 27, Bernard Gardens, Wimbledon, for all particulars of the Club membership forms, etc.

* * *

MR. N. H. BAILEY, President of the Manchester and District Model Railway Club, gave two lectures on locomotive construction at meetings held during February. One dealt with "The Boiler and the Firebox," and the other with "The Combustion of Flue Gases" and "The Superheater." On March 9 Mr. Bailey will deal with "Boiler Fittings and the Uses Thereof," while a special programme is being arranged for March 23, which will be the first anniversary of the formation of the Club. The Secretary is Mr. Archibald Dean, 29, Gorse Lane, Gorse Hill, Stretford, Manchester.



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Under this heading will be inserted short references to news items relating to locomotive engines and their duties. It must be understood, however, that information as to the stations of particular engines cannot be given, for the reason that, before the date of publication, transfers may have taken place, while lists of engines, &c., debarred from "The Why and the Wherefore" section, cannot be included under this heading. With this understanding, notes as to matters thought to be of general interest will be welcomed.

L.M.S.R.

New Midland type compound 4-4-0 locomotives Nos. 1090 and 1111 have been working on Derby to Bristol expresses. Others of the class in service on the Midland section include Nos. 1101, 1102, 1103, 1110 and 1113. L & Y. 2-4-2T No. 10621 was recently noticed on a Midland section suburban train at West Hampstead.—[J. G. GLOVER and "TALISMAN."]

Midland section 2-4-0 engine No. 215 recently worked into Nottingham on a light goods train from Derby. She has been rebuilt with Belpaire boiler and fitted with Ross "Pop" safety valves in place of the original spring balances. 4-4-0 No. 422 is also fitted with "Pop" safety valves.—[A. H. LEE.]

Two Midland 0-4-4T engines Nos. 1286 and 1413, rebuilt with Belpaire boilers, are working north of Leeds on local trains between Bradford and Leeds, and Bradford and Hellifield and Ilkley. New Midland type 0-6-0 No. 4093 *ex* Kerr, Stuart & Co. (Works No. 4343) recently worked a passenger train between Manchester and Leeds (New). No. 310, a Midland 4-4-0 (Class 1), in its original condition, recently worked the 3.32 p.m. Bradford to Leeds.—[A. P. HERBERT.]

L.N.W. No. 867, *Condor*, was recently noted piloted by 2-4-0 No. 866, *Courier*. On a railway having thousands of locomotives the combination of numbers is interesting.—[C. R. P.]

Locomotives recently turned out at Crewe rebuilt with Belpaire boilers include "Prince of Wales" class Nos. 433 and 974; also "18 in." class goods Nos. 1030 and 2326. Recent withdrawals include 0-6-0T shunting locomotives Nos. 3185, 3222, 3238, 3611, 0-6-0 special Dx goods Nos. 3242 and 3262, and 0-4-0T No. 3103.—[F. INGHAM.]

Suburban trains running into Bradford Exchange station on the old L. & Y. lines are worked by L. & Y. and a few L.N.W. 2-4-2T's. The Bradford-Marylebone ex-expresses are worked by the large Horwich 4-6-0 engines, and one of these has been fitted with an eight-wheeled tender. Other locomotives working in this district include Aspinall 4-4-0's and 4-4-2's, and 0-6-0 and large 0-8-0 goods locomotives. Several 4-6-0's of the "Prince of Wales" class are stationed in Bradford, and one of the 4-6-4T's occasionally works on a Manchester express.—[FRED INGHAM.]

L.N.W. expresses between Liverpool and Leeds, when double-headed, usually have a "Claughton" as train engine and an "Experiment" as pilot; 0-8-0 locomotive No. 2182 from Longsight shed was recently noted on a Manchester to Leeds slow train. No. 1324 *Falaba*, "Prince of Wales" class, fitted with a Belpaire boiler, is to be seen regularly in Leeds, and also a "Cauliflower" 0-6-0 No. 1268.—[A. P. HERBERT.]

L.N.W. locomotives Nos. 510 *Albatross*, and 520 *Panopea*, of "Precursor" class, and No. 1967 *Cressy*, "Renown" class, from Carlisle shed are at present in regular service between Carlisle and Carnforth. "Prince of Wales" class Nos. 261 and 487 have also been seen on this work, together with "Precursor" class No. 1430 *Victor*, and "Renown" class No. 1977 *Mars*. "Precursor" No. 1297 *Phalaris*, and "Renown" No. 1917 *Inflexible*, have been seen at Grange on trains from Lancaster. "Precursor" No. 276 *Doric*, has been stationed at Whitehaven for some time past and employed on trains to Barrow and Ulverston. The Furness "Baltics" are stabled at Barrow, and work between Lancaster and Millom. On special occasions these engines have worked through to Manchester.

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Furness 4-4-0 No. 10188, which was fitted with a L. and Y. type boiler, &c., two years ago, is now in the shops; 0-6-0's Nos. 12480 and 12483 (F.R. Nos. 3 and 6), have L. and Y. pattern boilers with Belpaire fireboxes, and in appearance resemble L. and Y. 0-6-0's of class 27; 4-4-0's Nos. 10140 and 10146 (F.R. Nos. 47 and 129) have also been fitted with L. and Y. boilers, but without Belpaire fireboxes. No. 10140's appearance is unaltered, but No. 10146's is modified. An L. and Y. 0-6-0, No. 1256, was recently turned out of Barrow shops as No. 12130. The Furness shed at Carnforth is closed, and the engines have been transferred. The goods locomotives are now stabled at the Midland shed, and the passenger locomotives at the L.N.W. shed. The latter bear the shed plate 27C affixed in the usual L.N.W. position.—[" FURNESSIAN."]

There are 20 Midland type compound locomotives stationed at Carlisle Caledonian shed. These are numbered 1065/9 and 1135/49, and work to Glasgow and Perth over the Caledonian section, and to St. Enoch via the G. and S.W. section. A Midland type rail motor works all the trains on the Moffat branch, and G. and S.W. 0-6-2T No. 9 has been engaged on shunting duties on the Midland section at Carlisle for the past nine months.—[N. MACKENZIE.]

G. and S.W. 2-6-0 locomotives Nos. 17825 and 17829 were noted at Perth working fast goods between Carlisle and Dundee.—[J. A. HODGE.]

L. N.E.R.

The following Pacific type locomotives are among those to receive names recently: Nos. 2546 *Donovan*, 2551 *Prince Palatine*, 2552 *Sansovino*, 2558 *Tracery*, and 4474 *Victor Wild*. No. 2582 of this class, recently attached to Newcastle shed, is now working on the G.N. section, and her place at Newcastle has been taken by No. 2562 from the Doncaster link. The numbers of the 4-4-2T's referred to on page 167, lines 9 and 10, second column, of the February issue, should read 4503, 4506, 4509, 4514 and 4525, and the G.N. " Atlantics," mentioned earlier on the same page, should read Nos. 3272, 3280, 3295, and 4402. The Nos. 82 and 124 applied to the Darlington-built 2-6-0's on the same page are in error as there are no engines of this type bearing the numbers referred to. The caption under the illustration on page 133 of " Pacific " type *Persimmon* should give the number as 2549.—[" FLYING FOX," W. G. BOYDEN, J. D. ROBINSON, and M. C. PITTS.]

The following locomotives have been observed at King's Cross during the first half of January:—2-6-0's Nos. 113 and 114, new 0-6-2T's Nos. 409, 426, 460, 464, 473, 907 and 913, and 4-6-2's Nos. 2553, 2554, 4470 *Great Northern*, 4471 *Sir Frederick Banbury*, 4472 *Flying Scotsman* and 4480.—[" PUFFING BILLY."]

Further new 0-6-2T's, noted in January, were working as follows:—Nos. 456, 475, 912 and 919 on the G.N. section suburban area; Nos. 918, 935, and 940 on Watford trains on G.C. section; and Nos. 952, 967, 968, 970, 971 and 987 on the G.E. section to and from Liverpool Street. G.C. type 2-6-4T No. 5339 was noticed at Prince's Risboro', and No. 5341 at Aylesbury.—[J. G. GLOVER, W. G. BOYDEN, G. WHITEHOUSE, and C. K. DOUGLAS.]

2-6-0 locomotive No. 4656 from the G.N. section has recently been working goods trains on the Cambridge main line of the G.E. section.—[" HOCKERILL HALT."]

With reference to the list of G.C. named locomotives recently given in these columns, a large number of readers have written confirming that the names and corresponding numbers given therein are correct. No. 5104 is *Queen Alexandra*, No. 5424 *City of Lincoln*, and the number of *Queen Mary* is now 6021, while No. 5509 still bore the name *Prince Albert* when noted in the Manchester district comparatively recently.—[ED. R.M.]

The following G.C. section locomotives have been noted recently at Banbury:—Nos. 5423 *Sir Sam Fay*; 5429 *Prince Henry*; 5431 *Edwin A. Beasley*; 5434 *The Earl of Kerry*; 5501 *Mons*; and 5504 *Jutland*. It is unusual for these locomotives to work the G.W.R.-L.N.E.R., Weymouth, Oxford, Nottingham, and York trains, the engines of which are changed at Banbury, as G.C. " Atlantics " Nos. 6090 and 6091, and G.N. section " Atlantics " are usually employed on these duties.—[" CENTRALEM."]

Ex R.O.D. 2-8-0's Nos. 5383, 6197, 6212, 6231, 6241, 6324, 6363, 6496, and 6762 have been employed on the G.N. section. " Pacifics " Nos. 2551, *Prince Palatine*, 2556 *Ormonde*, 2573 *Harvester*, 2576 *White Knight*, 2581 *Neil Gow*, and 2582 *Sir Hugo*, have recently been seen at King's Cross. N.B. Nos. 10433 and 10447 are at York.—[G. RAY and J. MIRAMS.]

The majority of trains working into Bradford Exchange are hauled by tank engines of the Ivatt 4-4-2 and 0-6-2 types. About five of the G.C. section superheated 4-6-2T's are stationed here, and three of the Ivatt 5-ft. 8-in. 0-6-0's Nos. 5, 8 and 9 are at East Bowling shed. Engines of these types take their turns on all kinds of passenger traffic, including the London expresses, which they usually work as far as Wakefield

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to be joined to the Leeds portions for London.—[F. INGHAM.]

Five 4-8-0T type locomotives have been completed at Darlington and sent to Hull. They are class X, and are numbered from 1656 to 1660.—[F. INGHAM.]

N.B. 4-4-0 No. 9499 *Wandering Willie* is now stationed at Carlisle. G.N. 4-4-0 No. 3056 is working between Carlisle and Layholm on local trains. No. 3062 of the same type is working locals between Ladybank and Perth, and during December a locomotive of this type was noted at Queen Street, Glasgow, having worked in from Perth *via* Kinross and Alloa. These Glasgow-Perth trains are sometimes worked through by a N.B. small 4-4-0, and more often by a "Glen" type engine.—[J. A. HODGE, M. MACKENZIE, AND G. W. SPARK.]

The word "more," appearing on page 83, line 4, col. 1, of the January, 1926, issue should read "none."—[A. P. HERBERT.]

G.W.R.

"Star" class 4-6-0 locomotive No. 4062 *Malmesbury Abbey* has been observed working local trains at Bristol. "Castle" class engine No. 4088 *Dartmouth Castle* has been seen with one of the new large tenders, working a West to North express through Bristol. New 2-6-0's Nos. 6367 and 6368 are now in service.—["TALISMAN."]

The series of new 2-8-0T's, Nos. 5245—5259, is now completed, while Nos. 5650—5659 of the new 0-6-2T's of class "56" are now in service. 4-6-0 locomotive No. 4032 *Queen Alexandra* is being converted to conform with the "Castle" class, and *Caerphilly Castle* has just left Swindon works after overhaul. Tank engines Nos. 184, 188, and 352 formerly Port Talbot Nos. 9 and 13, and Taff Vale No. 122 respectively, have been rebuilt with G.W. boilers, &c., practically retaining only their original tanks and bunkers. With further reference to 4-4-0's formerly working in Cornwall, the sole remaining locomotive of this class stationed south of Plymouth is now No. 3398 *Montreal*. The majority of the "Dukes," formerly in Cornwall, are now gradually getting further north. Nos. 3275 *St. Erth*, 3279 *Tor Bay*, 3258 *The Lizard*, are at Swindon and Reading, also Nos. 3259 *Merlin*, 3291 *Thames*, 3280 *Tregenna*, 3276 *St. Agnes*, and 3271 *Eddystone* are at Aberystwyth.—[H. ROBINSON.]

One of the 2-6-0 type locomotives of the late M. and S.W.J.R. has been working lately in the Bristol G.W.R. district. She is now numbered 24, and is fitted with a Belpaire type boiler of the older G.W.R. standard with large dome, and the relatively small size of the driving wheels—4 ft.—gives the engine a somewhat singular appearance. One of this class in its original condition was illustrated in Mr. E. F. Ahrons' article on the M. and S.W.J.R., which appeared on page 439, of vol. 53, of the *Railway Magazine*.—[L. B. H.]

S.R.

4-6-2T No. 520E was recently noticed on a down goods at Basingstoke. It is unusual for locomotives of this class to work down so far.—["458E."]

Several of the "King Arthur" class locomotives have recently been used on the through trains as between Guildford and Oxford.—[J. H. ASTON.]

With reference to the ex-L.B.S.C. "Terrier" mentioned in recent issues as having been numbered 734 by the late L.S.W.R., and now in the "W" series of the S.R., the present No. 734 of the Western section is a 0-4-0 saddle tank, bearing the date 1876, and employed on shunting duties at Guildford. She carries the name *Clausentum*, and was the only old L.S.W. locomotive to retain a name-plate. The number-plate "L. & S.W.R. 734," carried low down on the framing, shows that the number was given before the grouping, and not at the removal of the "Terrier" 734 to the "W" list. 2-6-0 locomotive No. 866, exhibited at Wembley last year, is again in service, with the section letter "A" added on the tender, but not on the number-plate. She is employed on goods trains in the London district of the Western section.—[S. C. CROWTHER-SMITH.]

Brighton section 0-6-0T. No. 661B, is fitted for auto-train working in the Western section style and now works on the Lee-on-Solent branch. Latest Adams locomotives to be fitted with Drummond boilers include 4-4-0's Nos. 680E and 0473E, 0-4-4T No. 194E, and Beattie's 2-4-0T No. 0298E. Brighton section B2x class 4-4-0 No. 201B has been fitted with a double dome boiler and top feed.—[M. BOTTEM.]

Several "Brighton" engines, while still retaining their former brown livery, have, under Southern rule, had their numbers painted out on the cab sheets and the standard Southern plate substituted. Some are, however, having the old type "Brighton" figures reinstated, but this time upon the tender under the initials "L.B.S.C.," the engine itself carrying only the plates. Locomotives so treated include Nos. 59, 191 and 423, *inter alia*. The backgrounds of the name-plates upon Brighton section engines are being painted red, and one or two "Atlantics" (*e.g.*, No. 422, *North Foreland*), in addition to No. 329, *Stephenson*, have already appeared with this added distinction. No. 333, *Remembrance*, is apparently not going to receive name-plates, since it still

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preserves the old Brighton style of painted name upon the tanks, being the only Southern locomotive so treated. The last survivors of the old Brighton collection of named engines are Nos. 42, *His Majesty*, and 66, *Billinton*, both of which appear substantially the same as they appeared under Brighton ownership, save that in the latter case the buffer-beams are in the new Southern vermilion colour, with S.E. pattern numerals. This was explained to me at Brighton last year as follows :- that No. 66 was booked for total repainting in green, but was found to be in such very good condition as to have a further lease of life in brown, the buffer-beams only being repainted. It remains to be seen which of these two engines will earn the distinction of having been the last old Brighton engine to retain its former name and livery. No. 42 has borne its name ever since building in 1902.—[O. J. MORRIS.]

Irish Railways.

WITH reference to the notes appearing in the February issue under this heading, in which it was stated that all the D. & S.E. engines not given in the list of new numbers had been scrapped, it should have been mentioned that 2-4-0T No. 44 is still running, though marked for scrapping. This engine is mentioned by Mr. Ahrons on page 115 of the February issue as built by Beyer, Peacock & Co., 1883, and was rebuilt at the D.W.W.R. works, 1902. Of the other engines described by Mr. Ahrons, 2-2-2 tank No. 34 was scrapped in 1923; she had been rebuilt with a cab some years before. The 1885–91 2-4-0 tank engines were dealt with as follows :—Nos. 2, 9, 47 and 49 were rebuilt with larger boilers in 1914, 1916, 1912, and 1914, respectively. No. 2 was scrapped last year at Inchicore. Nos. 45 and 46 were rebuilt as 2-4-2 type in 1910 and 1911. 2-4-0 motor tank engine *Elf* (formerly D.S.E. 69) has been re-converted to 0-4-0 type and is stationed at Broadstone. Re-numbered M.G.W. section engines lately turned out include No. 531, 4-4-0's, formerly No. 4 *Cyclops*, now No. 549, formerly No. 128, *Majestic*, now No. 643, and 0-6-0, formerly No. 46. Some of the M.G.W. engines have their new numbers painted on the buffer-beams, the lamp brackets having been removed to the usual position on the foot-plating. The M.G.W. engines had no lamp brackets in front of the funnel, as the head codes only required two lamps or one. The five "F" class 0-6-0 engines built in 1921 by Armstrong, Whitworth & Co. Ltd., Nos. 44–48, had numbers on the buffer-beams, as these locomotives were painted by the makers before being sent to Ireland. No. 643 is the first "F" class engine to be re-numbered. Recent appointments of G.S. & W. engines to the D.S.E. section include 0-4-4T No. 279 and 4-4-0 No. 303. M.G.W. 2-4-0 No. 34, *Aurora*, has left this section and has gone back to the Broadstone-Mullingar service.

"372" class 2-6-0's Nos. 374 and 375 are on traffic, and Nos. 376 and 377 will soon be out.

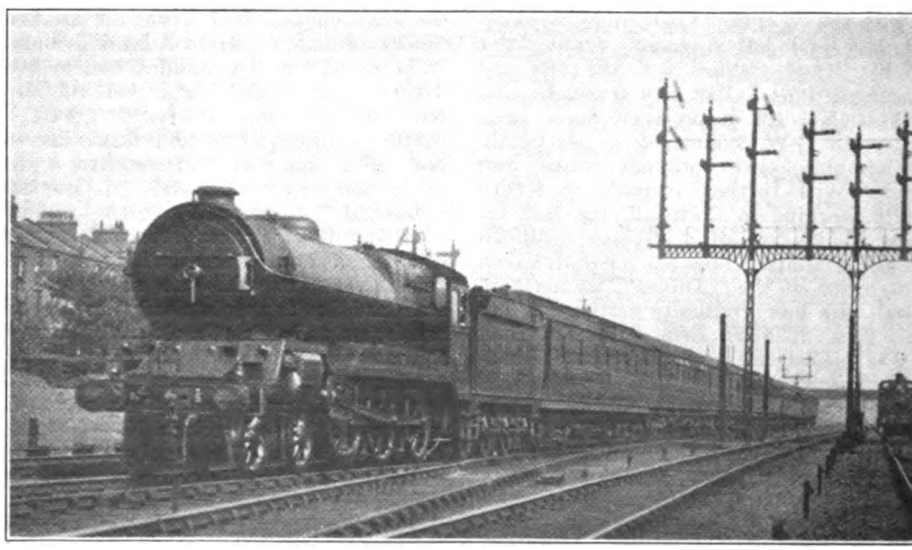

Photo.] UP EXCURSION TRAIN APPROACHING FINSBURY PARK, L.N.E.R. [*F. R. Hebron.*

G.C. 4-6-0 (mixed traffic) No. 5484, with altered chimney, dome, &c.

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THE RAILWAY MAGAZINE.]

DOWN LEEDS AND BRADFORD RESTAURANT CAR EXPRESS, L.N.E.R.

Three-Cylinder 4-6-2 Locomotive No. 2544.

(From a Photograph by M. W. Earley.)

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Photo.] GENERAL VIEW OF POOLE STATION. [*F. Thomas.*

The Southern Railway in the Poole District.

By J. THORNTON BURGE and R. A. HARDY.

IN a previous article an account was given of the old main line to Weymouth. The author first mentioned described the portion from Brockenhurst to Hamworthy Junction; we now propose to deal with Hamworthy Junction and the railways to the South of that point linking up the old line with the Bournemouth district, and Poole.

At one time a considerable transfer of passenger traffic took place at Hamworthy Junction, but at present owing to the closing of the Hamworthy branch for passenger traffic and the opening of the direct Bournemouth line, this is much smaller than in the past, but with the erection of a large number of new residences in the neighbourhood the local passenger traffic will doubtless grow in the near future. Hamworthy Junction is at present an important centre for the marshalling of goods trains many of which are made up there for various points east of the Junction. It is well provided with siding accommodation, there being three goods sidings on the up-line with a total length of 640 yards, in addition to a short siding provided with a 20-ton truck weighbridge and two loading docks, while on the down-line side there are six sidings with a total length of 1,548 yards. There is also a private siding into the Kinson Pottery Company's brick and tile works. We may mention that these works during the War were utilised for the storage of explosives.

The actual station goods traffic is not heavy, except in the early part of the year, when large numbers of poultry appliances are forwarded from a local factory.

There are two passenger platforms at Hamworthy Junction, the one on the up-line side being 452 ft. in length. On this platform are situated the Booking and Station Foreman's Offices, Porters' Room, Ladies' Waiting Room and the Booking Hall which serves also the purpose of a General Waiting Room. The down-platform is of the "Island" pattern, and is 450 ft. long. The southern side of this platform used to accommodate the Hamworthy Branch line passenger trains but, as this has been discontinued this

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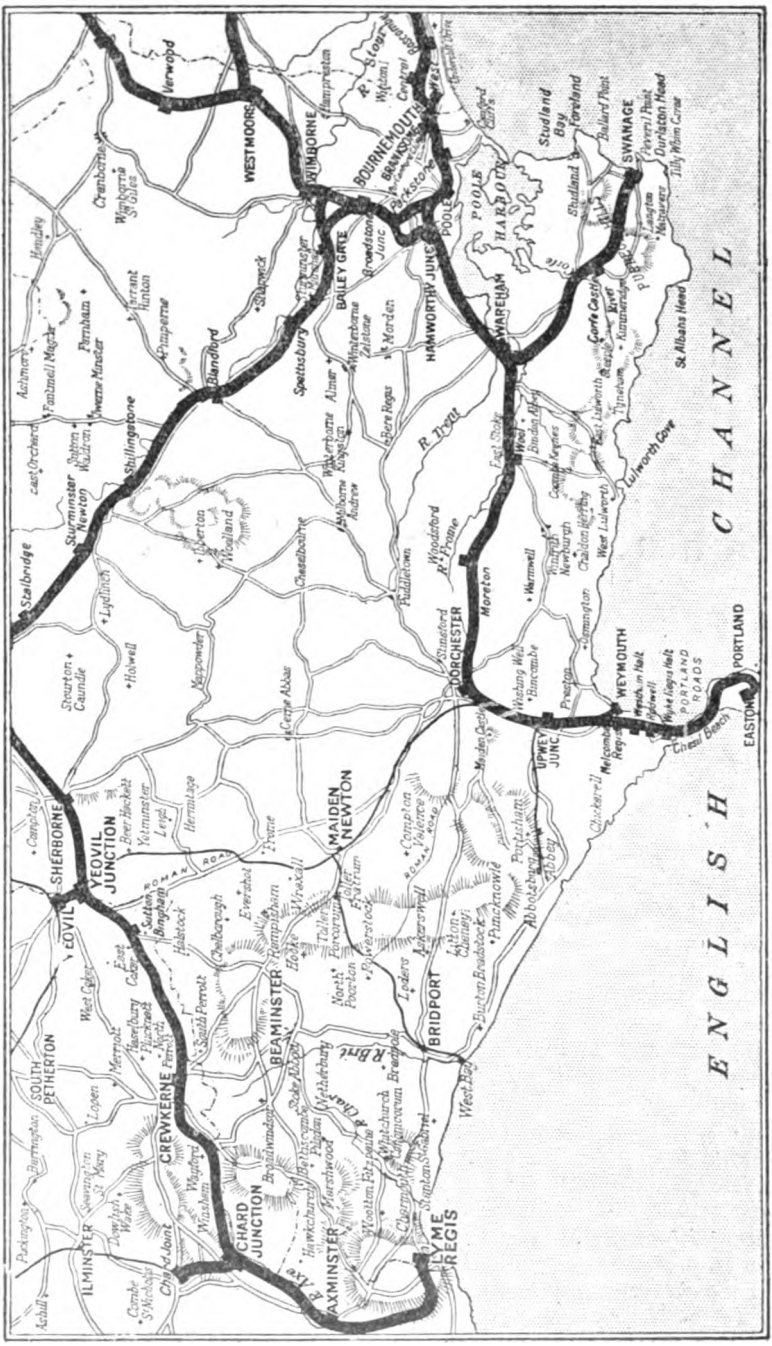
ENGLISH CHANNEL
WEST MOORS
WIMBORNE
BOURNEMOUTH
BRANKSOME
BAILEY GATE
HAMWORTHY JUNC.
POOLE
HARBOUR
WAREHAM
SWANAGE
Studland Bay
Durlston Head
Tilly Whim Caves
St Albans Head
Lulworth Cove
Corfe Castle
Wareham
Blandford
Spetisbury
Shillingstone
Sturminster Newton
Stalbridge
Verwood
Cranborne
Wimborne St Giles
Ferndown
Wareham
Bere Regis
Moreton
Dorchester
Stinsford
Maiden Newton
Bridport
Upwey Junc.
Weymouth
Portland Roads
Portland
Easton
Cheesil Beach
Abbotsbury
Pinckneys
Chickerell
Lyme Regis
Axminster
Chard Junction
Beaminster
Crewkerne
South Petherton
Ilminster
Yeovil Junction
Yeovil
Sherborne
Sutton Bingham
Yeovil Junction
Roman Road
Maiden Newton
Dorchester
Bridport
Lyme Regis
Axminster
Chard Junction
Crewkerne
Ilminster
Yeovil
Sherborne
Yeovil Junction
Maiden Newton
Dorchester
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Weymouth
Portland Roads
Portland
Easton
Cheesil Beach
Abbotsbury
Pinckneys
Chickerell
Lyme Regis
Axminster
Chard Junction
Beaminster
Crewkerne
South Petherton
Ilminster
Yeovil Junction
Yeovil
Sherborne
Sutton Bingham
Yeovil Junction
Roman Road

platform is now used principally for goods traffic. The signal cabin is situated at the eastern end of this platform. It contains 53 levers in use and controls the movements in the yard, the branch to Hamworthy and the Junction where the old and new main Weymouth lines diverge to re-unite at Lymington Junction, one running *via* Bournemouth and Sway and the other line *via* Ringwood.

There is a small engine shed at the western end of the station. Here three locomotives are stabled, one of these being the engine which works on Poole Quay and the others for local goods and shunting services. A stationary pumping plant supplies water for these engines, and the main line locomotives which obtain their water at Hamworthy Junction. The storage tank holds 14,700 gallons. The loco. depot is under the direction of the Bournemouth Central foreman, Mr. Elliott, and the station and traffic working under Mr. Hardy, the Stationmaster at Poole.

At the western end of Hamworthy Junction Station the line to Hamworthy branches off to the South. This is now a single line approximately 1½ miles in length, and is worked under the train staff system, only one engine in steam or two coupled being permitted on the branch at one time.

For many years after the opening of the line in the early fifties Hamworthy was the only station for Poole and Bournemouth, and the branch from Hamworthy Junction to Hamworthy at that time dealt with the whole of the passenger and goods traffic for Poole and Bournemouth. But it must be noted that in those days Bournemouth was only a small seaside village, and the land on which the present fine roads, gardens, streets and buildings now stand, in those days was covered with pine copses, sand dunes and gorse and heather commons. Hamworthy Station, which is now only a Goods Depot, was then an important station.

As a matter of fact, in 1851 the population of Bournemouth was only 695, and in 1861 it was 1,707 ; ten years later it was 5,896, but by 1881 it had increased to 16,895. To many of the old inhabitants the coming of a railway to Bournemouth was an abomination, and the opposition to its advent was great. At a public meeting one speaker quoted the couplet :—

" 'Tis well from far to hear the railway scream,
And watch the curling lingering clouds of steam ;
But let not Bournemouth—health's approved abode—
Court the new presence of the iron road."

A gentleman writing of his journey to Bournemouth in those days recounted his experiences thus :—

" I began with a 15-mile drive to Chippenham Station, then my troubles began and, after exploring what seemed to me the whole South Coast, I finally reached Hamworthy Station. A Porter informed me Bournemouth was five miles further. He had never been there himself but there was a good road and I had better go by ' Oxford '—why I should go by ' Oxford ' to get only 5 miles was a puzzle, when the mystery was solved by the driving up of a little old omnibus kept by ' G. Axford ' who conveyed passengers once a day to Bournemouth."

In 1862 the branch from Ringwood to Christchurch was constructed and this brought the village of Bournemouth a little nearer the railway. An enterprising trader of Christchurch then ran an omnibus to Bournemouth from the Christchurch Station in opposition to the Hamworthy 'bus. This 'bus very adversely affected Hamworthy as a traffic centre accommodating the rising town of Bournemouth.

On March 14, 1870, a further blow came when the railway from Christchurch to Bournemouth East was opened to the detriment of both Christchurch and Hamworthy.

The railway from the present Broadstone Junction (then Poole Junction) to Poole was opened in 1872, and the extension from there to Bournemouth West in 1874. As the new Poole station practically took all the passenger traffic for Poole, Hamworthy station was finally closed for passenger traffic in 1893.

At present the Hamworthy branch is used only for goods traffic.

Hamworthy station is situated alongside the water in Poole Harbour and, although the old up-platform has practically disappeared, the down-platform, together with the station offices, &c., still survive and the siding accommodation more than meets the present requirements, although during the War, when Poole was a naval base, various craft used to replenish their

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bunkers at Hamworthy, consequently thousands of tons of coal were then dealt with at this depot. The principal outwards traffic at present are tiles, timber, and scrap iron, the latter being forwarded by firms engaged in the breaking up of naval craft.

Leaving Hamworthy Junction by the Holes Bay Extension in the direction of Bournemouth, the railway crosses one of the backwaters of Poole Harbour by means of an embankment, two overbridges being provided for tidal purposes. At Holes Bay Junction signal cabin the line joins the line from Broadstone Junction. These three lines form a triangle—Hamworthy Junction, Holes Bay, and Broadstone Junction—two sides of which are about 2 miles long by a base of 4 miles formed by the Old Weymouth main line.

Holes Bay Junction signal cabin contains 27 levers and is worked by three signalmen. A mile further south in the direction of Bournemouth, Poole station is reached. Poole is one of the most interesting towns in Dorset and in the past was closely associated with the Newfoundland trade, besides being a haunt of smugglers and others connected with the disposal of contraband goods. The town possesses a public library, Museum, School of Art, and one of the finest parks on the South Coast, where boating, bowls, cricket, &c., are freely indulged in. The park also possesses a fine aviary and swans abound on the lake. Although Poole is an ancient borough it is now, with Christchurch, almost considered to be a part of its neighbour Bournemouth. It is interesting to note that what are often, in newspaper parlance, considered to be parts of Bournemouth are really in the borough of Poole, among these being Branksome Park and Canford Cliffs. Many prominent persons who have stayed in these localities have been notified by the press as having spent vacations in Bournemouth, whereas they have actually resided within the precincts of the Borough of Poole—in fact, to-day a stranger does not know when the one town ends and the other begins. The harbour at Poole is undoubtedly one of the finest natural havens on the South Coast, covering an area of 60 square miles. It is, however, regretted that the presence of a sandbank at the entrance prevents larger craft from entering, although a scheme is in hand which, it is hoped, will, to some extent, improve its present position. The Borough of Poole covers an area of 7,964 acres and the population numbers 45,000. Within the area are five railway stations: Branksome,

Photo.] **OLD STATION AT HAMWORTHY.** [*J. T. Burge.*

Now used as a goods depot, but once the only passenger station for Poole and Bournemouth.

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Parkstone, Poole, Hamworthy Junction and Hamworthy Goods.

Poole station is constructed on a very sharp curve, the down-platform being 629 ft. in length and the up-platform 652 ft. On the down side is a bay road leading to the passenger loading dock, fish store, &c. A connection off this line runs to the quay. On the down-platform are the stationmaster's, station foremen's, booking and parcel offices, ladies' and general waiting rooms, fish store and a small bookstall. On the up-platform are the collectors' office and ladies' and general waiting rooms. The main bookstall is also on this platform.

the North are formed entirely of London Midland and Scottish passenger stock. In the summer months the passenger train service is considerably augmented and many relief and excursion trains are run. There is a frequent train service to local places of interest such as Wimborne, Corfe Castle, Wool (for Lulworth Cove), &c., and to the seaside resorts of Bournemouth, Swanage and Weymouth.

Statistics show that during a recent period of twelve months 330,131 passenger tickets and 298 season tickets were issued, whilst 428,111 tickets were collected. In addition to these figures, a considerable transfer of passengers from stations in the

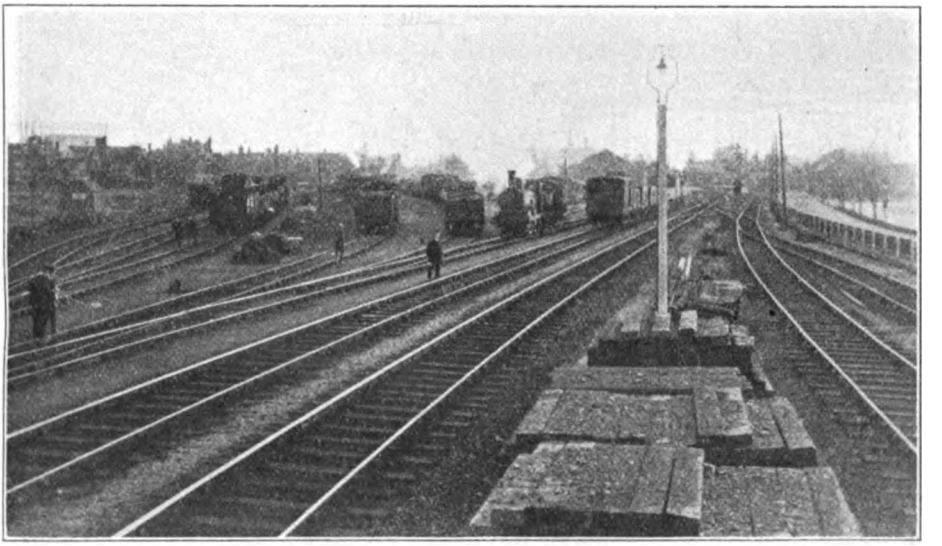

Photo.] GOODS YARD, POOLE. [*F. Thomas.*

The passenger traffic at Poole is heavy and the present time-table provides for nearly 100 passenger trains per day on week-days. There are through trains to the following, among other important towns, viz.: London (Waterloo), Portsmouth, Southampton and Salisbury on the Southern Railway, and Bath, Bristol, Bradford, Leeds, Liverpool, Lincoln, Manchester, Nottingham, Sheffield, York, &c., on the London Midland and Scottish Railway. The Somerset and Dorset Joint Railway has running powers through Poole, and it is by means of this railway that through communication is established with the Midlands and the North. It may be pointed out that the through trains from

direction of Weymouth to the L.M.S. line, Salisbury branch, &c., and *vice versa*, is dealt with, this traffic being particularly heavy during the summer months, large numbers of long-period excursionists to and from the Midlands and the North changing at Poole.

Another item in connection with passenger-train working which should not be overlooked is the transfer of passenger-train vehicles which, as a rule, is no mean item during the day. It is also of interest to note that an old bye-law of the borough requires that all trains stop at Poole station, this requirement being duly observed by the railway company.

The parcels traffic is also fairly heavy,

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the inwards traffic being in excess of the outwards, over 55,000 parcels and nearly 1,200 tons of miscellaneous traffic being dealt with during the period of twelve months already mentioned. These figures, of course, represent " station " traffic only, but if transfer traffic was included the number of parcels would be over 100 per cent. higher. An outwards item which should be specially mentioned is the sprat traffic, which is a seasonal traffic passing from November to about February. The fish are usually landed on the quay from the fishing fleet during the afternoon and early evening and are bought from the fishermen by the dealers, who arrange for cartage to the station, where special vans are in readiness for their conveyance. Consignments are forwarded to several of the important towns, in addition to the London markets, the vans being forwarded by passenger or milk trains and, in the case of London traffic, by express goods train. This is frequently so heavy as to necessitate the provision of additional clerical and outside assistance at short notice.

The goods train traffic is both heavy and varied, the shunting operations being practically continuous, 29 goods trains being dealt with during the 24 hours. In November, 1922, the railway company decided to adopt the " banking " engine arrangement for up goods trains between Poole and Branksome, and this innovation has proved of great advantage to the goods train operations. The goods yard is situated on the up-line side, the connections with the up and down main lines being at the western end of the station, and comprises 12 sidings with a total length of 2,176 yards. Alongside No. 2 road is an open transfer platform constructed of wood whilst farther on this road enters the warehouse, a lofty and commodious brick building, capable of holding nine wagons. The goods offices adjoin the warehouse.

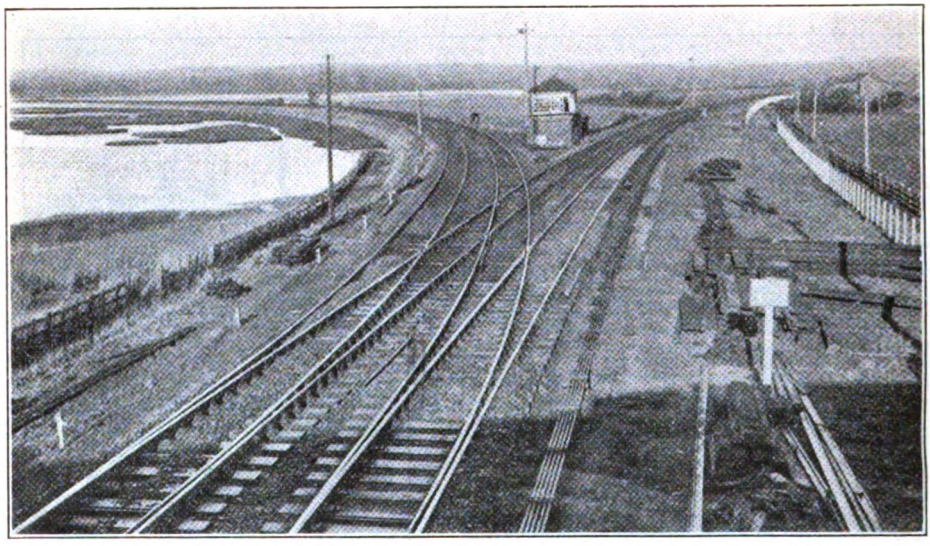

Photo.] **HOLES BAY JUNCTION.** [*F. Thomas.*

Line to Broadstone Junction (right) and to Hamworthy Junction (left).

A 5-ton crane, 20-ton truck weighbridge cattle loading dock and a general loading dock are provided in the goods yard.

On the down-line side are two sidings used for marshalling the wagons to be taken to, or brought from, Poole Quay. As already mentioned the single line to the Quay leaves the station by means of a connection in the down bay line and runs along the public road through portions of the town for about threequarters of a mile before the Quay is reached, many large timber sheds and other commercial buildings being served *en route*. On the Quay, which is about a quarter of a mile in length, there are two lines of rails. A small locomotive is used to take

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these goods trains to and from the Quay through the town.

The sea-borne traffic dealt with is frequently very heavy, coal and timber being the two inwards traffics which are chiefly handed to the railway company for conveyance. Various other commodities are also dealt with in smaller quantities.

Several of the pleasure steamers, which are so popular with holiday-makers at Bournemouth and Swanage, berth alongside the Quay at night during the summer season and on Sundays these steamers perform excursions from Poole, the Southern Railway Company providing a special train for the conveyance of passengers from Bournemouth, &c.

During the twelve-months' period previously mentioned, statistics show that 67,530 tons of general goods, 60,871 tons of coal, and 29,540 tons of other mineral traffic were dealt with. The total turnover of wagons in the goods yard during the period was 166,968.

Recent developments at Poole include new and up-to-date works of The Bournemouth Gas and Water Company—with commodious siding accommodation—at Pitwines, and also Messrs. Sykes and Son's Pottery, with siding connection, at Creekmoor, situated between Poole and Broadstone Junction, both of these sidings being under the control of Poole station.

There are two signal-boxes and one gate box at Poole, three cross-over roads being worked from the signal boxes. The staff at this station totals 52, including 10 clerks, under the station master, Mr. A. J. Hardy.

Immediately after leaving Poole Station, in the direction of Bournemouth, two level crossings are passed, one in the Towngate Street and the other in the High Street. Very stringent rules and regulations have been made by the railway company to reduce to a minimum the natural inconvenience to the public caused by these level crossings passing over the busy streets of the town and, in consequence of these crossings, it is noteworthy to mention that Poole enjoys the exceptional privilege of all fast trains both up and down stopping there, a compensation which is of no small value to the town.

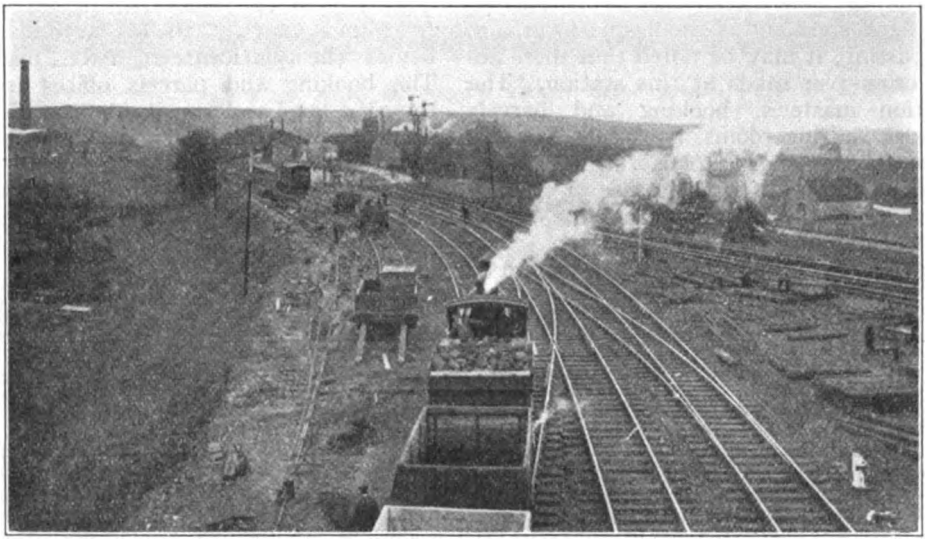

Photo.] HAMWORTHY JUNCTION. [*F. Thomas.*

Leaving Poole in the direction of Bournemouth, the railway skirts the harbour for about half a-mile on the western side, whilst to the left is the fine park and the extensive salt water lake. A steep incline brings us to Parkstone Station. This station serves a large residential area, including the popular seaside resort known as Sandbanks, conse-

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quently the passenger bookings are fairly high. A considerable amount of parcels and goods train traffic is also dealt with at Parkstone, particularly the latter. The goods yard is situated on the down-line side, behind the down-platform, the connection with the main line being west of the station. A goods warehouse is provided alongside one of the sidings, and the garage used for housing the delivery motor-vans is also in the goods yard. At the western end of the yard is a connection with a private line running to Messrs. Geo. Jennings' Potteries; traffic over this line being hauled by the firm's private locomotive, an 0-4-0 tank engine, named *George Jennings*.

The signal-box at Parkstone is situated at the western end of the up-platform and, in passing, it may be noted that there are no cross-over roads at this station. The station master's, booking and parcels offices, waiting rooms, bookstall, &c., are situated on the up-platform. A footbridge is provided for the use of passengers proceeding to and from the down-platform.

Parkstone station, which is in charge of Mr. H. Dyson, the stationmaster, is built on the side of a hill and a passenger standing at the western end of the platforms can obtain a very fine view of Poole Harbour, with the Purbeck Hills in the background. Well laid-out lawn tennis courts can be found within a short distance of the station.

At the next station—Branksome—the line joins the triangle which connects the old and new main lines with Bournemouth Central and Bournemouth West stations. There are two cross-over roads, both worked from Branksome Junction signalbox. The station is under the supervision of the station master at Bournemouth West.

The station is below the level of the road and stairs have to be descended before the platforms can be reached. The booking and parcels offices are on the road level and are situated on the up-line side, a footbridge giving access to the down-platform from the booking hall. Ladies' and general waiting rooms are provided on both platforms, which are protected by verandas of the umbrella pattern.

CHRISTMAS DAY IN NEW ZEALAND, 1925.

Photo.] WELLINGTON-AUCKLAND "LIMITED" EXPRESS. [*C. J. Housego.*

This train consisted of 19 vehicles, hence the use of two 4-6-2 locomotives.

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Photo.] **4-6-2 No. 3.1163 ON DOWN TRAIN NEAR PARIS.** [*W. H. C. Kelland.*

The Northern Railway of France.

[No. II.]

By LORD MONKSWELL.

IN August, 1924, I travelled to Calais on engine 3.1226, working the 10 a.m. train from Paris. The train was composed of 12 vehicles and weighed 417 English tons (424 metric tons) exclusive of engine and tender.

Post 3 was passed in 3 min. 43 sec. and post 7 in 6 min. 22 sec. There was a slight reduction of speed at St. Denis, where the rebuilding of the station was in progress.

Between posts 7 and 27 the speed varied very little. The 20 km. took 12 min. 52 sec. (58 m.p.h.) and the 27th km. 39$\frac{2}{5}$ sec. (57 m.p.h.). Steam was cut off at about 45 per cent. of the stroke in the high-pressure cylinders with steam pressure slightly reduced at the regulator. The low-pressure cut-off was about 65 per cent.

Downhill, 18 km. from post 30 occupied 9 min. 4 sec. (74 m.p.h.), the regulator being shut from time to time.

Post 51, just beyond Creil and 31$\frac{3}{4}$ miles from the start, was passed in 32 min.

Speed recovered to over 60 m.p.h. after the Creil slack, but then there was a very long slack from about post 59 (the line was being re-laid with 24-metre rails) which cost about 3$\frac{1}{2}$ min. (posts 59–67 in 8 min. 11 sec.). In these circumstances speed had not been fully regained by post 66, where the ascent to post 86 begins, and we took 3 min. 16 sec. for the 5 km. up 1 in 250 to post 71. The remaining 15 km. to the summit occupied 9 min. 26 sec. (59 m.p.h.), and from post 82 onwards the speed was over 60 m.p.h.

Once over the brow of the hill, 32 km. from post 90 took exactly 16 min., post 126 was passed in 77 min. 14 sec. from the start, and Amiens in 80 min. 15 sec. Twenty-six km. from post 142 took 14 min. 11 sec. (68 m.p.h.), and Abbeville (109 miles) was reached in 107 min. 15 sec. from Paris.

A stop of a little over 5 min. was made at Abbeville. Starting again, we passed post 182 in 6 min. 14 sec. and then ran 21 km. along the level in 11 min. 50 sec. (66 m.p.h.). Soon after this there was another relaying slack, which lost us about a minute. The steep part of the bank

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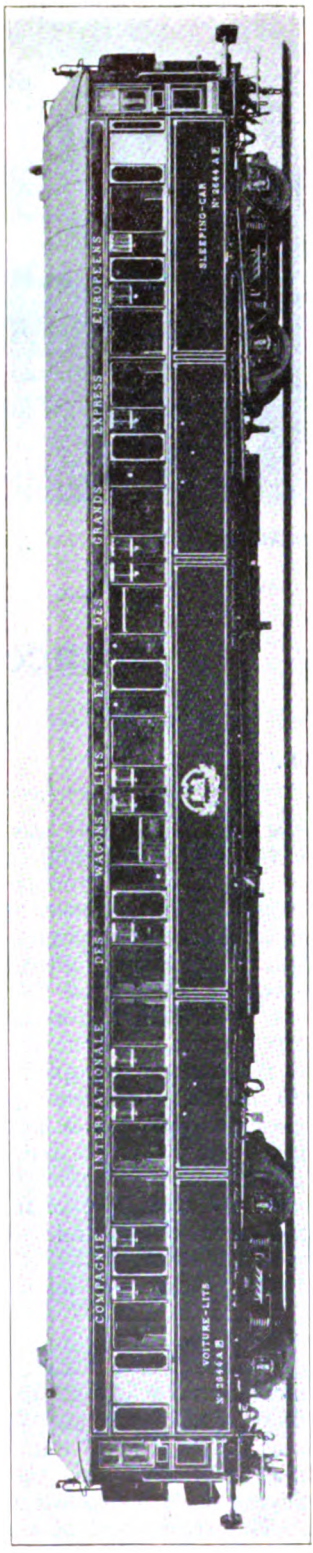

SLEEPING CAR FOR "BLUE TRAIN," CALAIS-MEDITERRANEAN SERVICE.

leading up to the summit near post 238 was begun at about 63½ m.p.h., and the 238th km. occupied 42⅖ sec. (52¾ m.p.h.). Two km. down the farther side of the bank were run in 59⅘ sec. The 268th km. occupied 30⅗ sec., the 269th 32 sec., and the 277th 50⅘ sec. (44 m.p.h.), the nine to post 277 taking 6 min. 15 sec. (53·6 m.p.h.).

Calais was reached about 3½ min. early, in 77 min. 12 sec. from Abbeville (75¾ miles). We had left Paris about 1½ min. late.

The return train was the 2.50 p.m. from Calais. It was composed of 12 vehicles and weighed 380 English tons behind the tender. It was worked by engine 3.1222. This engine differs from No. 3.1226 in having flat-slide valves for the low-pressure cylinders. All the engines previous to No. 3.1222 have flat slide valves for the low-pressure cylinders, and all subsequent engines of the series have piston valves.

The start from Calais is never rapid on account of the existence of many sharp curves for the first few kilometres. Post 292 was passed 5 min. 37 sec. from the start; the next kilometre occupied 44⅖ sec. and the next 40⅖ sec. (55¼ m.p.h.). The train was therefore going at about 57 m.p.h. when it struck the 1 in 125 gradient, which begins just before post 290. I missed post 289, but the 2 km. to post 288 occupied 80⅕ sec. and the next, where the gradient eases to 1 in 400 for a short distance through Fréthun station, 42⅕ sec. Thence the speed slowly fell till kilometre 282–281 took 45⅕ sec. The next took the same, and then for the last kilometre wholly on 1 in 125, which is straight, and where the orifice of the blast pipe may have been enlarged, the time was 44⅘ sec. (49·9 m.p.h.). All the time the regulator had been wide open and steam cut off in all four cylinders at 65 per cent. of the stroke. The 11 km. of practically continuous 1 in 125 occupied 7 min. 55 sec., so the average speed was 51¾ m.p.h.

From kilometre 244 there are about 3 km. each of 1 in 133 and 1 in 143 to post 238. These 6 km. took 3 min. 59 sec. (52½ m.p.h.). After this quite easy running brought us to Abbeville 81 min. 10 sec. from the start.

We stopped 3 min. at Abbeville and, starting again, passed Amiens in 29 min. 30 sec., kilometres 167–138 taking 16 min.

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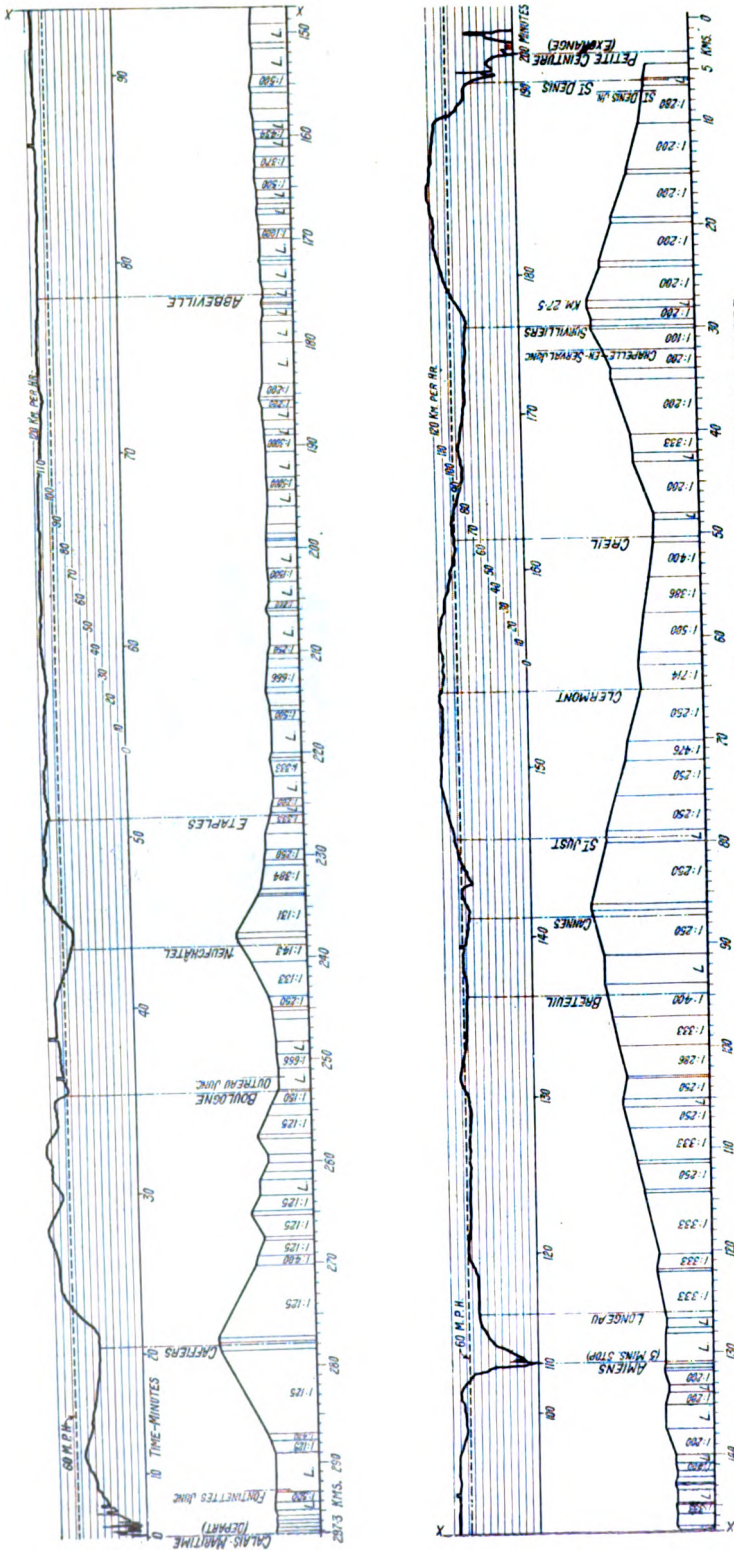

GRADIENT PROFILE AND SPEED CHART, CALAIS (MARITIME) TO THE VICINITY OF PARIS.

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23 sec. (65¾ m.p.h.). Kilometre 121–120 was run at about 66 m.p.h., and the 15 from post 120 to post 105 in 9 min. 3 sec.; these are all uphill at about 1 in 333, and the average speed was thus 61¾ m.p.h. From post 105 to post 91 the gradient eases in places, and the speed rose a little (14 km. in 8 min. 15 sec. = 63 m.p.h.), and after that slowly fell to 61·4 m.p.h. for the last kilometre, wholly uphill, to post 87. The descent to Creil was then made under easy steam. Beyond Creil kilometre 48–47 took 35⅜ sec., nearly 63 m.p.h., and then speed gradually fell till the kilometre to post 42 was run in 38⅔ sec. (58¼ m.p.h.). Here the gradient eases for a short distance and the speed rose above 60 m.p.h., but when the 1 in 200 was again reached at post 40 it fell again, and kilometre 38–37 occupied 38⅕ sec. (58½ m.p.h.). After this there was a long and severe permanent way slack and the run was of no further interest. Paris was reached punctually at 6.14¼ p.m. in 118 min. 22 sec. from Abbeville.

Monsieur Brévillé has recently been so kind as to send me a number of diagrams showing particulars of the more recent work of the new 4-6-2 engines.

The most remarkable of these is the one on page 263, which shows the running of the train-de-luxe from Calais on December 16, 1925. This train runs in connection with the train leaving Victoria at 11 a.m. It was composed of 14 of the International Sleeping Car Company's vehicles for Switzerland, Vintimille, Trieste and Constantinople, and weighed 608 metric tons (as nearly as possible 600 English tons) behind the tender.

The boat had left Dover 26 mins. late and the train left Calais 31 mins. late. The weather was very bad with frost and snow.

The engine was—as in my own case—No. 3.1222 and the driver was the same.

At the start the brakes of one of the vehicles would not work properly and 2 min. were lost in this way before Calais (Town) station—1½ miles—was passed. After this there does not appear to have been any further trouble, and Amiens was reached in 104 min. from Calais (Pier).

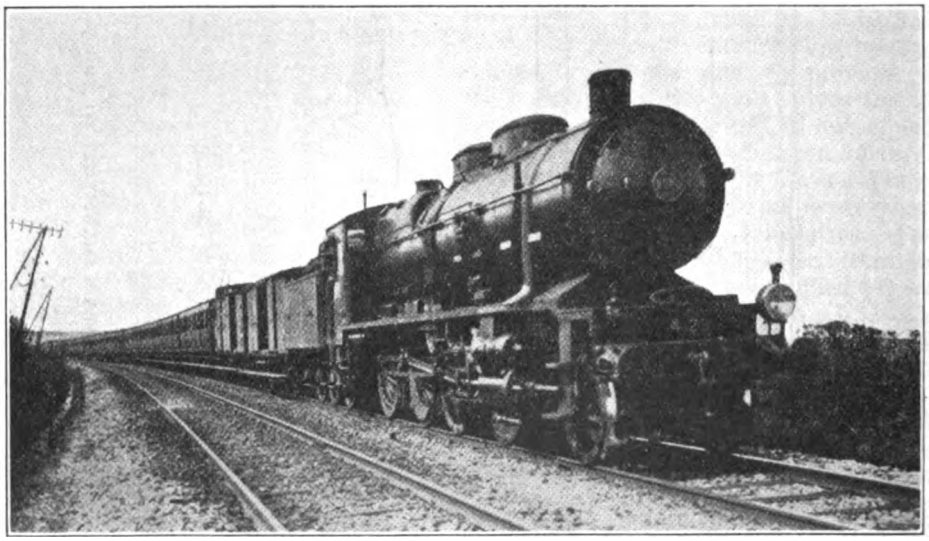

Photo.] **2-8-0 No. 4.291 ON BOULOGNE-CALAIS TRAIN.** [*W. H. C. Kelland.*

The 11 km. (6¾ miles) of 1 in 125 to Caffiers summit took 9½ min., and at the summit the speed was 37 m.p.h.

Fifty-nine and a-half miles, all nearly level, from passing Etaples to stopping at Amiens took 53 min. Here a stop of 5½ min. was made.

After Amiens, 25 miles before the Gannes summit, mostly on gradients of 1 in 250 and 1 in 333 up, took 26 min.; beyond the summit there was a slack, and Creil was passed in 51 min. from Amiens.

Even so, the train had not been able

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to make up anything like the 31 min. by which it was late when starting from Calais, and its subsequent running was hampered by its being out of its proper place. Nevertheless the speed at Survilliers summit was about 46 m.p.h., and it completed the run to the point whence it was transferred to the Petite Ceinture in 85 min. from Amiens.

During the whole run the boiler had easily furnished all the steam required and the water-level had been very high. For the greater part of the way the high-pressure cut-off had been 40 per cent. of the stroke and the low-pressure cut-off 65 per cent.

Nine km. of 1 in 125 up to the Caffiers summit were run in 6½ min. and the speed did not fall below 43½ m.p.h.

On November 5, 1925, engine No. 3.1205 worked the 8.10 a.m. train from Paris to Liège, 228 miles. As far as Aulnoye, the first stop (134¼ miles), the train was composed of 14 carriages weighing (behind the tender) 506 metric tons, or as nearly as may be 500 English tons. Speed did not fall below 53 m.p.h. up the Survilliers bank, and for 50 miles of nearly level line between Creil and Tergnier averaged 68 m.p.h. with slight variations. On the 1 in 200 (with short easier bits) before Busigny the average was 56 m.p.h.

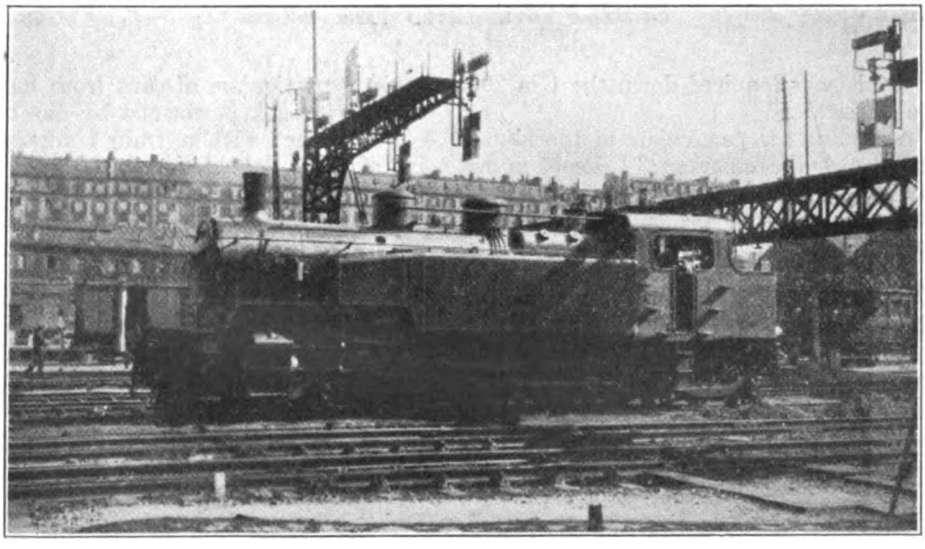

Photo.] **4-6-4 TANK ENGINE No. 3.801 AT GARE DU NORD.** [*C. E. W. Neat.*

On October 17, 1925, No. 3.1223 hauled a train of 13 vehicles weighing 537 metric tons (530 English tons) behind the tender on the noon train from Paris to Calais.

The run to Abbeville occupied 113 min. On this section 3 min. were lost owing to a relaying slack near Chantilly.

The speed at the Survilliers summit was about 55 m.p.h. In these circumstances the work done in lifting the train against gravity amounted to 1,100 h.p. The remaining resistances can hardly have amounted to less than another 1,100 h.p.

The section between Creil and Amiens (49½ miles) occupied 49 min.

After the Abbeville stop the remaining 75¾ miles to Calais (Pier) took 78 min. and the lowest 54 m.p.h. The run was completed in 128 min. The authorized speed limit of 120 km. (74½ miles) an hour was nowhere reached, the highest speed being about 73 m.p.h.

On October 26, 1925, engine No. 3.1221 worked the 9.15 a.m. train from Lille to Paris. The 12 vehicles of the train weighed 446 metric tons. The last 119¼ miles from Arras to Paris were run start-to-stop in 122 min. In comparison with some of the preceding performances this run was a leisurely one. Speeds of 51 m.p.h. at Achiet summit, ten miles out of Arras, 53 at Gannes and 48 at Survilliers, sufficed to keep the train so well up to time that no higher speed than

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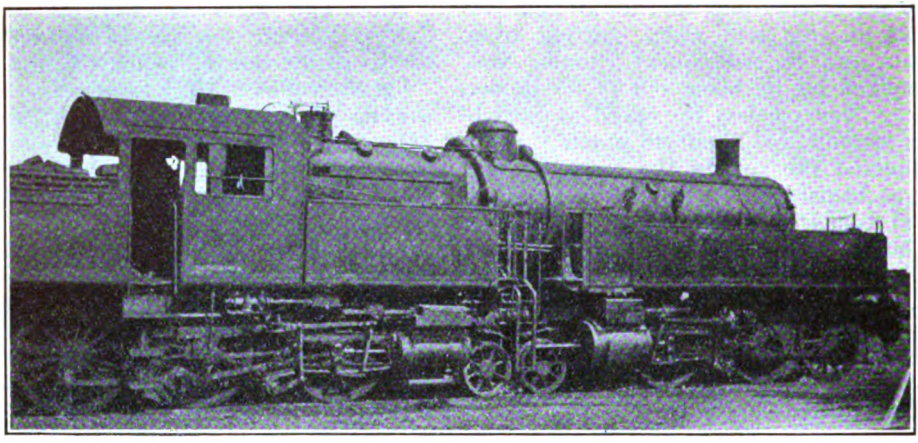

Photo.] **0-6-2-2-6-0 ARTICULATED TANK ENGINE.** [*Lord Monkswell.*

67 m.p.h. was required down the 1 in 200 into Paris.

In sending me particulars of the above runs M. Brévillé remarks: "I do not know why we, who have heavy trains, and at certain seasons of the year even very heavy trains, are given credit for trains of moderate tonnage only."

A perusal of the above figures will, I think, for the future make it impossible for anyone to pretend that the Nord engines do not tackle trains of great weight.

In addition to the foregoing I have received particulars of runs from Paris to Calais and back performed by one of the 4–4–2 engines with a train composed of six of the International Sleeping Car Company's "blue" vehicles of the latest type. This was a trial run to test the running at high speed of these carriages which are to be used in new trains *de luxe*, which it is proposed to put on shortly. The train weighed 285 English tons behind the tender.

The run of 185 miles was in each case performed without a stop. The Paris–Calais run was completed in 3 hrs. 1 min.

Photo.] [*J. Kite.*

4-4-4 TANK ENGINE No. 2.294 ON BOULOGNE-ST. OMER TRAIN AT SAMER.

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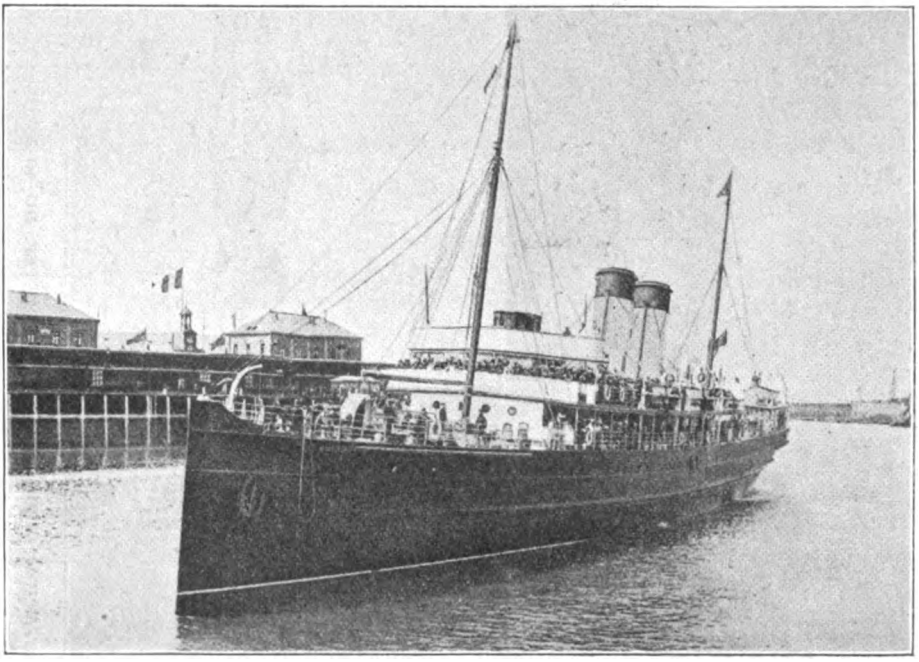
though 6 min. were lost between Creil and Gannes by a preceding train blocking the way. The Calais-Paris run occupied 2 hrs. 59 min., and in this case also time was lost after Creil for a similar reason.

On the outward journey Survilliers summit (17 miles) was passed in 19 min., and Creil (31 miles) in 30 min.; the 59½ nearly level miles between Amiens and Etaples took 53 min., and the 9 km. of 1 in 125 to Caffiers summit were run in 6½ min., 46 m.p.h. being the minimum speed.



TURBINE STEAMER "THE QUEEN" ENTERING BOULOGNE HARBOUR.

On the return journey the lowest speed before Caffiers was 46½ m.p.h. Etaples (44 miles from Calais over a really hard road) was passed in 45 min., the 59½ miles on to Amiens took 54 min., and the 49½ miles thence to Creil 48 min.

M. Brévillé appends the following note upon the new 4-6-2 engines:

"The new 4-6-2 locomotives put into service in 1924 by the Chemin de fer du Nord are intended to haul heavy express passenger trains. They are four-cylinder compound engines on the system introduced on our line in 1885, to which we have always remained faithful on account of the complete satisfaction which it gives us. They are, of course, equipped with superheaters.

"It is first and foremost by increasing steaming capacity that we have sought an increase of power; with this object in view the dimensions of the boiler have been notably increased. But we have held to the principle of avoiding fireboxes which overhang the frames and of adhering to deep fireboxes which fit in between the frames. This arrangement greatly facilitates the work of firing.

"As a matter of fact the production of steam is always ample with a moderate consumption of fuel.

"A train weighing 500 tons behind the tender requires a consumption of 4,500 kilogrammes of fuel for the 185 miles between Paris and Calais (54 lb. per mile). In this figure are included the fuel put on to the grate between lighting up and the departure of the train, and also that consumed between arrival and the time when the engine is put away in the shed.

"The high-pressure valves are cylindrical and the low-pressure valves are flat and specially designed in such a manner

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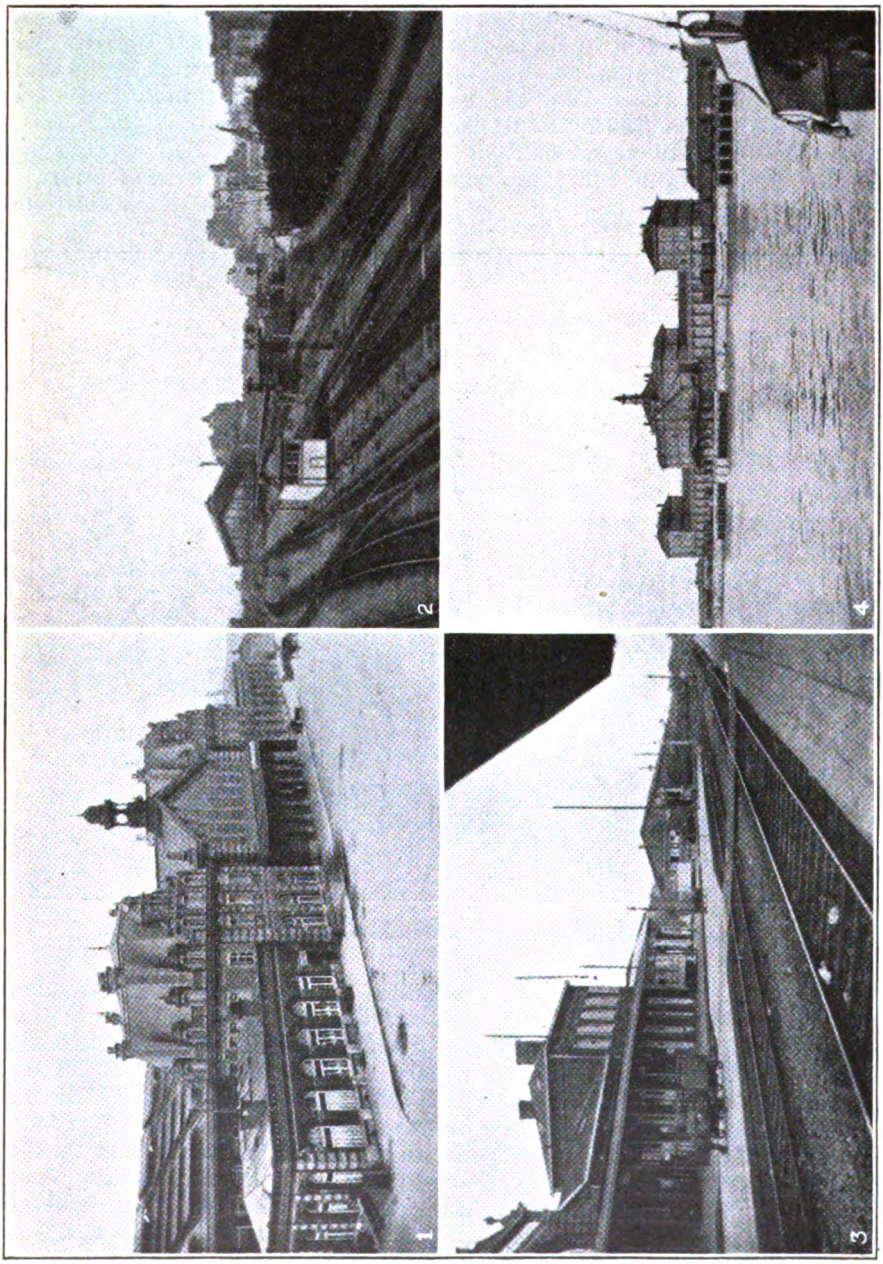

Photos.] **STATION VIEWS ON THE C. DE FER DU NORD.** [*R. Doust.*

1.—Arras (exterior).
2.—Arras (platforms).
3.—St. Pol.
4.—Calais (maritime).

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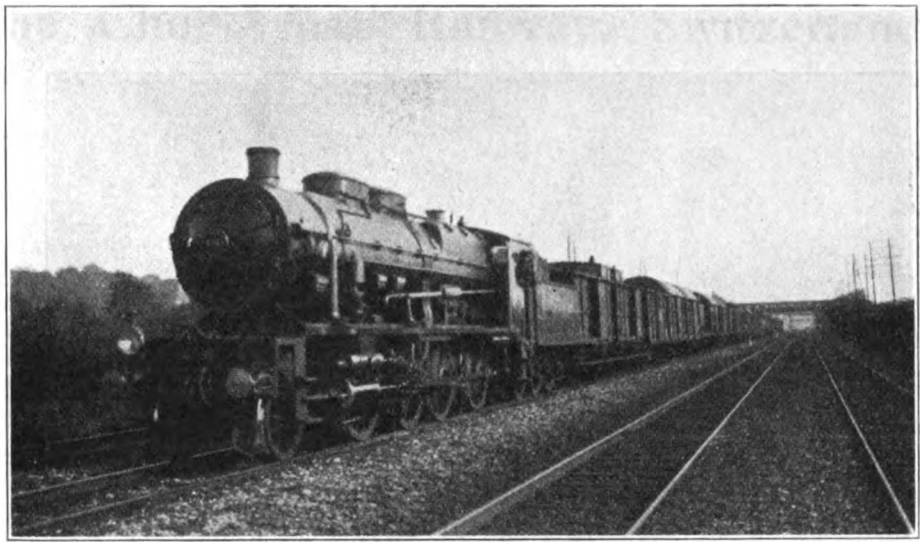

Photo.] 2-8-0 No. 4.195, ON FREIGHT TRAIN. [*W. H. C. Kelland.*

that 85 per cent. of the surface is balanced. The steam and exhaust ports are extremely large so as to facilitate the movements of the steam. The engine thus runs very easily and is capable of very high speed.

"The tenders carry enough water for a run from one end of our system to the other without taking in a fresh supply at any intermediate point.

"The lighting of the engine is carried out by means of a little turbo-dynamo, which lights the engine head-lights and illuminates the number of the train, which is thus easily recognised in the stations."

My most sincere thanks are due to Monsieur Brévillé, Chief Mechanical Engineer of the Chemin de fer du Nord, for innumerable facilities which I have enjoyed through his kindness. I am also deeply indebted to his two predecessors, the late Monsieur du Bousquet and Monsieur Asselin.

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GARRATT LOCOMOTIVE HAULING TEST TRAIN, BURMA RAILWAYS.

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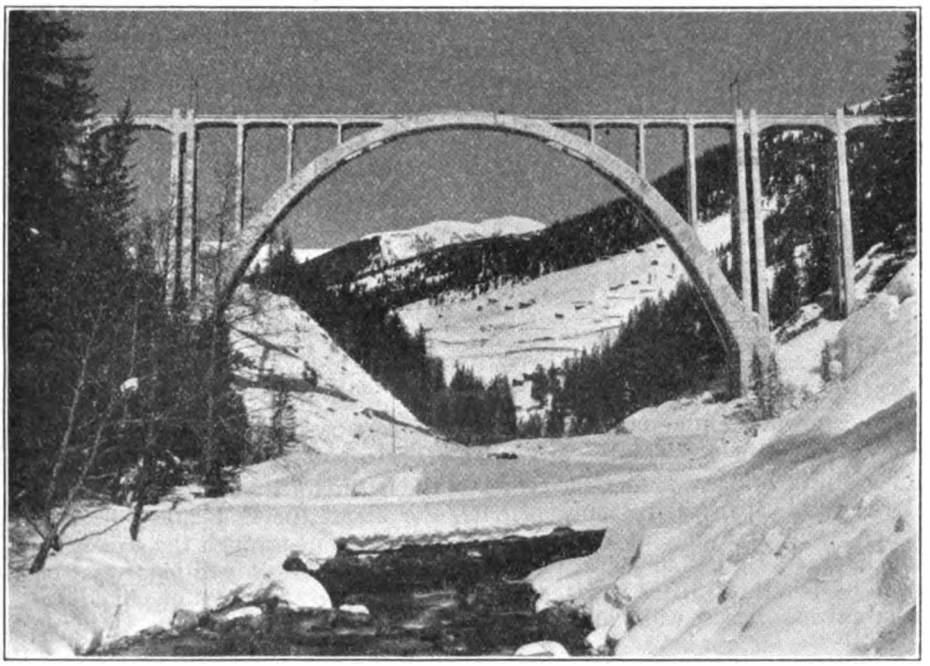
The Chur-Arosa Railway, Switzerland.

By W. A. WILLOX, A.M.Inst.C.E.

THE Canton of the Grisons in Switzerland is served by about 250 miles of metre-gauge lines in addition to the standard-gauge sections of the Federal Railways. The whole of the former system is now operated electrically from local hydro-electric power-stations. The most recent of these narrow-gauge lines is that connecting Chur (1,928 ft.), the terminus of the Federal main line from Bâle, and Arosa (5,715 ft.), a growing and popular health and sports resort, 16 miles distant.

It was built by a company in which the Canton of the Grisons and the Corporations of Chur and Arosa were the chief shareholders. Construction was undertaken simultaneously at different points on the route by a number of contractors under the supervision of the Chief Engineer, Herr G. Bener. Work was begun in 1912, and the line was opened for traffic in 1914. The total cost was 11,000,000 fr. (£440,000).

The railway traverses a valley of exceptional beauty, and possesses some remarkable engineering features, the most noteworthy of which is a reinforced-concrete viaduct with the largest single span of this type of construction in Switzerland. It is also noteworthy as being the first electric railway to be run with a direct current of 2,000 volts. Of its total 16 miles, 7·7 are curved, 4·5 of which have a radius of 65·6 yards, the minimum. The average gradient throughout is 1 in 21·7, and 11·2 miles are graded at 1 in 16·6, the maximum. There are 41 bridges with a total length of 1·1 miles, and several tunnels. Local circumstances largely decided the type of bridge construction, of which there are examples in stone arch, steel girder, and reinforced concrete. Of the last, there are two near Langwies worth special mention. One, the Gründje-Tobel bridge, has a single span of 92·9 yards. An interesting feature of the



A STRIKING VIEW OF LANGWIES VIADUCT.

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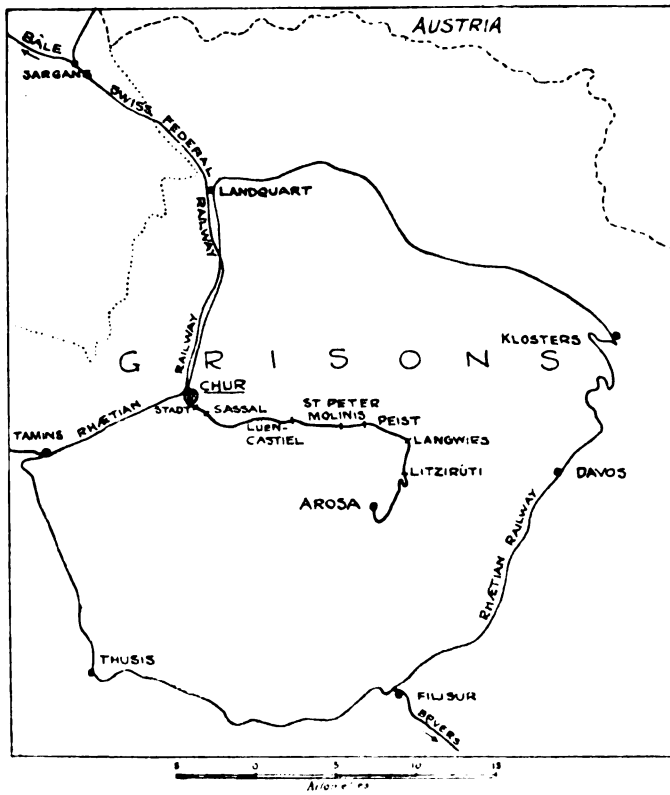

MAP SHOWING CHUR-AROSA LINE AND CONNECTIONS.

building of this bridge was that the centering for the main span was the same as that used for a similar bridge at Berne. The other, known as the Langwies Viaduct, has a total length of 313·7 yards, with a main arch 109 yards wide and 203 ft. high above the stream below.

One of the great difficulties of reinforced concrete construction at the altitudes of the upper end of this line is the short annual period during which meteorological conditions are suitable for working. The rapidity of construction necessary to build a viaduct of the type of that at Langwies economically is tremendous. On July 6, 1913, there was little to be seen on the site, but by September 6 the whole of the centering had been erected; exactly a month later practically all the concrete had been poured. The total weight of the steel reinforcement in the completed viaduct is 250 metric tons, and the volume of concrete 6,000 cubic metres. A notable feature of the centering was the use of reinforced concrete trestles up to the level of the springing of the arch. This can be clearly seen in one of the illustrations reproduced. Not only is this viaduct a notable feat of engineering, but also it is a standing vindication of the æsthetic value of reinforced concrete when properly and simply used, undisguised by other materials.

The passenger terminus at Chur is on the forecourt of the Federal station, in which is the booking office. The goods depot adjoins that of the Federal and Rhætian Railways. The main offices of the company are in the town. The workshops are at the top end of the town, on the way to Arosa. There are eight intermediate stations all with crossing loops, except those at Chur Stadt, half a mile from the terminus, and Sissal, 1¼ miles, which are both in the nature of tramway halts in the street. For about the first mile and a half the railway runs through the streets.

An open competition was held for designs for the station buildings. The design of a well-known Arosa architect was chosen for the intermediate stations, that at Peist being representative. They are of typical Swiss solid timber construction on concrete bases. The external timber is stained and varnished. It is decorated with coloured design discs under the eaves, a broad cream band at eaves level with a motto decoratively printed thereon in black, gold and red, and the name similarly printed in cream panels under the front and side windows of the upper story. The motto on the Peist station is "Es eilt die Zeit—mensch sei bereit!" ("Time flies—be ready!") The station at Arosa was built to the designs of another architect, and is of a different, though no less pleasing style. It is of stone, plastered and tinted cream. The window shutters are bright red, and

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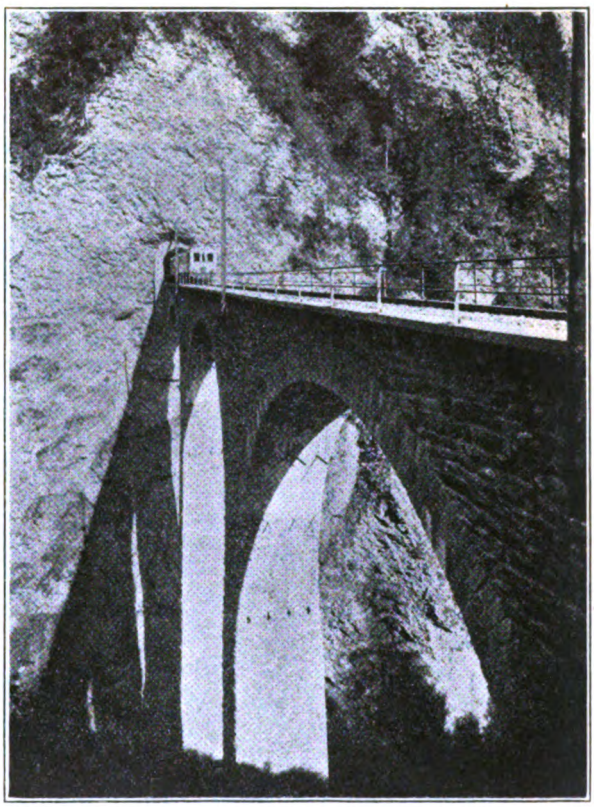
the window openings white with coloured-disc designs on some of the lintels. The roof is of sheet copper. There are few advertisements on the station walls, and these few are restrained and decorative.

There is a car shed at Arosa, capable of housing two trains. It is warmed electrically during the winter, and trains, run in at night covered with snow and festooned with icicles, are ready for traffic in the morning, cleaned and comfortably warm. The shed is of reinforced concrete construction, and has over it a timber house in which live some of the railway staff. This house originally stood upon the ground now occupied by the car shed, and was dismantled and re-erected on the top of the shed.

The permanent way is of 48 lb. per yard flat-bottom section rail, attached by clip bolts to steel sleepers. Crushed-stone ballast is used. There are no signals, the telephone method of operating the traffic being in use.



CASTIEL VIADUCT.

The rolling-stock consists of four bogie motor coaches, each of 400 h.p., and a number of four-wheeled trailers and goods trucks. The passenger coaches are of two classes, second and third. The former are upholstered in crimson plush, the latter have wooden slat seats. All are kept scrupulously clean, and are heated in winter by electric radiators. Lavatories are provided in the motor coaches. Central gangways enable the ticket inspector to traverse the whole length of the train. Central draw and buffing gear are used. The axles of the motor coaches are provided with ball bearings. All vehicles are fitted with automatic vacuum-brake equipment, and, in addition, the motor coaches use regenerative braking and, for emergencies, have a mechanical track brake, comprising four shoes pneumatically actuated. The braking systems are so regulated that, running downhill, the motor coaches are held back by the regenerative brake, while the vacuum brake takes care of the rest of the train. In this way the wear of wheel tyres and brake blocks, that would otherwise be greater on the motor coaches than on the trailers, is considerably reduced. In order to pull up the train, the vacuum-brake has, of course, to be applied throughout.

The current is drawn from the overhead contact wire by pantograph collectors operated pneumatically. For the lighting, heating and the compressor and exhauster motor circuits, a motor generator set is provided on each motor coach. The continuous output of this set is 40 kw. at 300 volts. The lamps are connected in series of three each, so that every lamp gets only a voltage of 100 volts. The heaters are provided for a terminal pressure of 300 volts.

The hydro-electric power station is situated in the valley below the railway near Lüen-Castiel, 8 km. from Chur, and contains two sets, one comprising a generator of 520 kw. driven by a water turbine, and the other, of the same capacity, driven by a three-phase motor. The

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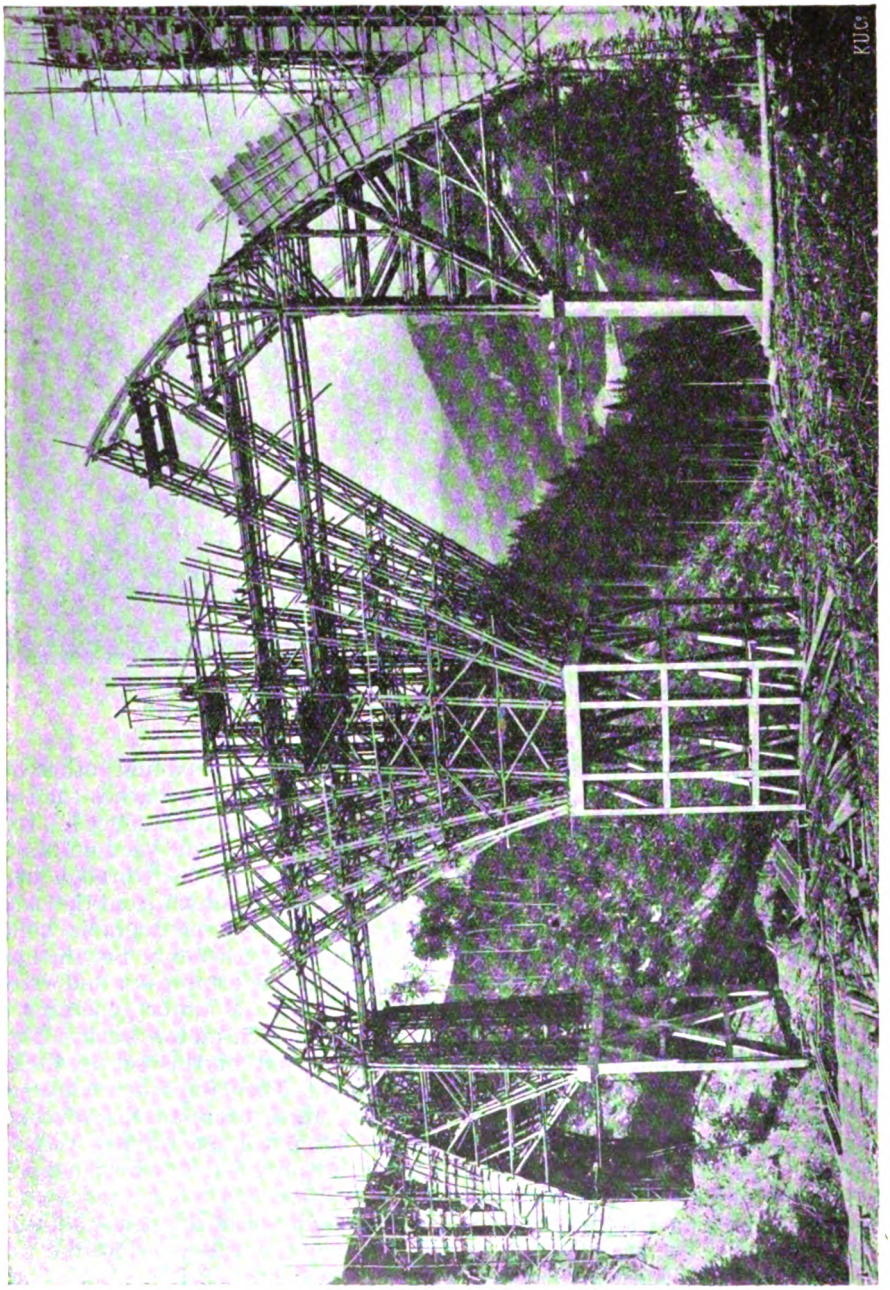

ERECTING MAIN ARCH, LANGWIES VIADUCT.

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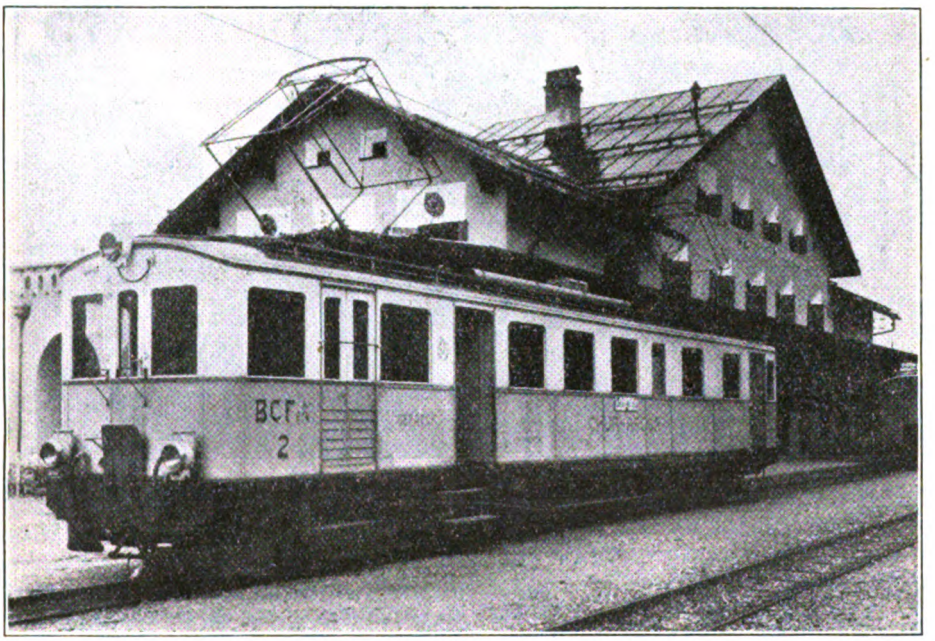
transmission is by overhead contact wires of 80 sq. mm. section, attached to the main supporting system by direct suspension on the open track. At stations and where the line runs through the streets of Chur, catenary suspension is provided, in order to prevent possible accidental contact of a broken wire with persons. On the two big viaducts aforementioned catenary suspension also has been used, in order not to spoil the general impression by too many supporting standards, spans of 100 m. being thus possible between yokes. The contact wire is double insulated by porcelain insulators throughout.

The whole of the electrical equipment and rolling-stock was provided by Messrs. Brown-Boveri & Co. Ltd., of Baden. There are normally five trains each way daily, supplemented in the busy seasons as may be required. The maximum speed allowed is 15½ m.p.h.



MOTOR COACH AT AROSA STATION.

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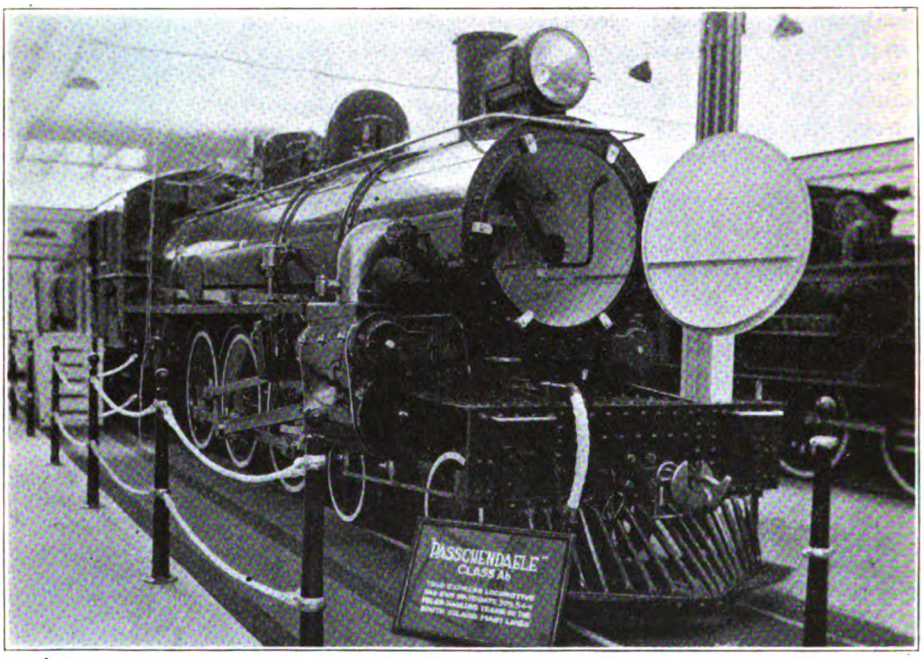
NEW ZEALAND WAR MEMORIAL LOCOMOTIVE.



NEW ZEALAND RAILWAY'S "AB" CLASS LOCOMOTIVE, WHICH BEARS MEMORIAL TABLET.

By the courtesy of Mr. G. S. Lynde, Chief Mechanical Engineer, New Zealand Government Railways, we are able to publish the accompanying illustration of a locomotive exhibited at the New Zealand and South Sea Exhibition at Dunedin, the exhibit being of note from the fact that the locomotive has been fitted with a brass tablet in memory of the men of the New Zealand Railway service who fell in the Great War.

Gen. Sir Charles Ferguson, the Governor-General of New Zealand, who was accompanied by the Hon. J. G. Coates, Prime Minister and Minister of Railways, and others, unveiled the tablet at the opening of the Dunedin Exhibition, and said that he thought all would agree as to the suitability of the memorial when it was considered that it was erected in memory of railwaymen. The tablet, which bears the following inscription—"Passchendaele: In memory of those members of the New Zealand Railways who fell in the Great War, 1914–18"—is enclosed in a laurel wreath, below which, in a circle, surmounted by a crown, is the monogram "N.Z.R." with on either side of the circle, a large fern leaf, New Zealand's national emblem.

The locomotive chosen to bear the memorial tablet was selected because she was the first of the "Ab" class, 4-6-2 type, built in the Dominion of New Zealand. Up to the time she was withdrawn from service in order to be exhibited this express locomotive had run 309,544 miles, hauling trains on the South Island main lines, and she will be returned to express train service after the Exhibition. The engine, which was built at Addington railway workshops in October, 1915, has two cylinders of 17 in. diam.; length of stroke, 26 in.; and boiler pressure, 180 lb. per sq. in. The total weight in working order of the engine and tender is 84 tons 15 cwt. As a contrast to the *Passchendaele*, an old locomotive, which had been taken off the scrap heap, was exhibited alongside.

This engine was built by the Vulcan Foundry some 53 years ago, and had been painted in her original colours—green with gold lines.

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Locomotive and Train Working in the latter part of the 19th Century.

THE MIDLAND GREAT WESTERN RAILWAY, IRELAND. [I.]

By E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

THE Midland Great Western Railway was, perhaps, the most Irish of the large main lines in Ireland. It seemed to stand apart from the others and to be less influenced by the railways on this side of the water. The Great Southern and Western appeared to possess a considerable flavour of the London and North Western, with which, of course, it had American mail and boat-train connections; the Waterford, Limerick and Western, in its turn, had a distinctly Great Western trend; and the Great Northern, in addition to its strong Ulster position, which differentiated it from other Irish railways, seemed to copy its English namesake in many respects, though, of course, it had no connections of any sort with the latter. But the Midland Great Western was something quite separate, Irish in all things, as was perhaps natural, considering the part of the country through which it passed in connecting the capital with the wild country of the west and north-west. One met fewer English people in its trains than in those of the other large railways, and if one travelled by any other than the down and up limited mails there were hardly any at all to be seen, except a few fishing enthusiasts. Travelling companions, other than these disciples of Isaak Walton, consisted chiefly of politicians, priests, farmers, and people who had a horse to sell. Most of them were cheerful and amusing, though it was just as well not to talk politics to the politicians, in case of accident. The latter could always give points in the game, and one often stood a fair chance of receiving other things in addition. Before starting on one journey O'Rourke considerately warned me that on the subject of politics I had all the characteristics of a hopeless outsider, but added reassuringly, "You've only to keep your mouth shut tight, and then you can go ahead like blazes."

The main line of the Midland Great Western runs from sea to sea in a fairly straight line, east to west, the distance from Dublin to Galway being 126½ miles. It presents the curious feature that practically the whole of the branch lines, some of which are equivalent to main lines, are on the north side, and that only three short spurs, in length between 7¼ and 10½ miles each, branch off to the south. The main line from Dublin to Mullingar, 50¼ miles, was opened in sections during 1847–48, and was completed thence to Galway in August, 1851. At Clonsilla Junction, seven miles from Dublin, what is known as the Meath line turns off northwards, and runs through Navan, 23 miles from the junction, to Kingscourt, 43 miles, or 50 miles from Dublin. It also includes a branch, 12 miles in length, which runs westwards from Kilmessan to Athboy. The "Meath line" may be considered as a long branch and has always had an extremely thin train service, partly, perhaps, because the Great Northern line also runs through Navan, which lies on the latter company's long branch from Drogheda to Oldcastle. The M.G.W.R. possessed running powers over a short section of the Great Northern branch between Navan and Kells. Navan is not a large place, and therefore the two companies came to an arrangement by which the traffic between it and Dublin was worked in such a way as to avoid undue competition.

At Enfield, on the main line, 26½ miles from Dublin, a short branch, about 10½ miles in length, runs in a south-westerly direction to Edenderry. There used to be one through business train in each direction between Dublin and Edenderry.

From Mullingar (50¼ miles) the long

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branch, or "Sligo Line," equal in importance to the main line itself, runs in a north-westerly direction through Longford to Sligo, 134¼ miles from Dublin. At Inny Junction on this line a railway, 25 miles in length, branches northwards to Cavan, and this in turn has a short spur, seven miles long, from Crossdoney to Killeshandra. From the main Sligo line there is only one short branch, nine miles in length, from Kilfree Junction. The next branch from the main Galway line is a short spur on the south side from Streamstown, 61 miles from Dublin, to Clara.

From Athlone what are known as the "Mayo lines" leave the main line for the north-west. The "Mayo lines" were originally an independent railway, known as the Great Northern and Western, which was opened at various dates between 1860 and 1868. It forms another of the long lines of about equal importance to the main line, and runs through Roscommon and Claremorris, the terminus before 1870 being at Westport, 82 miles from Athlone. In 1870–1873 a line from Manulla Junction (67 miles) was opened to Ballina, after which the main portion of the line was considered to terminate at the latter station, 88 miles from Athlone, though the Westport line was probably the more important.

Between Athlone, 78 miles from Dublin, and Galway there is only one short branch, 9 miles long, opened in 1890, between Attymon Junction and Loughrea, being the third spur on the south side of the main line. At Athenry junctions were made with the "west coast" extension of the Waterford and Limerick Railway from Limerick to Tuam.

At Clara and Athlone there were junctions with the Great Southern and Western Railway branch between Portarlington Junction and Athlone, and it was here that the only real competition, which the Midland Great Western had to meet occurred.

One other short branch, and that one of the most important on the system, remains to be mentioned, viz.: the North Wall line at Dublin. Coming into Dublin from the west, the main line passenger trains ran into the terminus at Broadstone, a station which stands in isolated and majestic loneliness on an elevation in the north of the city. At Liffey Junction, about 1½ miles from Broadstone, the goods trains leave the main line and run through Glasnevin to the company's own goods station at North Wall. The Great Southern and Western Railway used this line from Glasnevin Junction for their trains between North Wall and Kingsbridge, but have since made their own line somewhat to the north. The M.G.W.R. worked a few passenger trains between Liffey Junction and North Wall and the mail trains which ran from and to North Wall, were worked into Broadstone station over this line. It formed the only passage, other than, perhaps, the less important junction at Athlone, through which the railway communicated with the outer world.

The main line was double between Dublin and Ballinasloe, 91¾ miles, but from Ballinasloe through Athenry to Oranmore, a distance of 29¾ miles, the line was single, at that time with only two crossing stations, Woodlawn and Athenry. The block sections, between which the staff and tickets were used, were 9¾, 12 and 8 miles in length, respectively. The final length between Oranmore and Galway, just over 5 miles, was double.

The Sligo line was double for 26 miles from Mullingar to Longford, and single thence for 52½ miles to Carrignagat Junction with the Sligo, Leitrim and Northern Counties Railway, 5½ miles from Sligo. The latter company had running powers from this point into Sligo, over the double line of the M.G.W.R., and the Waterford, Limerick and Western Railway also used the same metals after October, 1895. On the Mayo lines, the section between Athlone and Roscommon, nearly 8¼ miles, was also double, as also was a short piece of the Meath lines from Clonsilla Junction.

The main line crosses the watersheds on both sides of the valley of the Shannon. There is a steep rise, mostly at 1 in 100 to 1 in 150 for the first 5½ miles from Dublin, after which there is a generally easy rise, broken by a few short falls, to Castletown, 58 miles. Thence to Athlone there is a long descent, much at 1 in 150 to 1 in 200, for 20 miles, which constitutes a hard pull for up trains in the opposite direction. The steepest gradients are west of Athlone on the single-line sections. From Ballinasloe to Woodlawn there is a stiff

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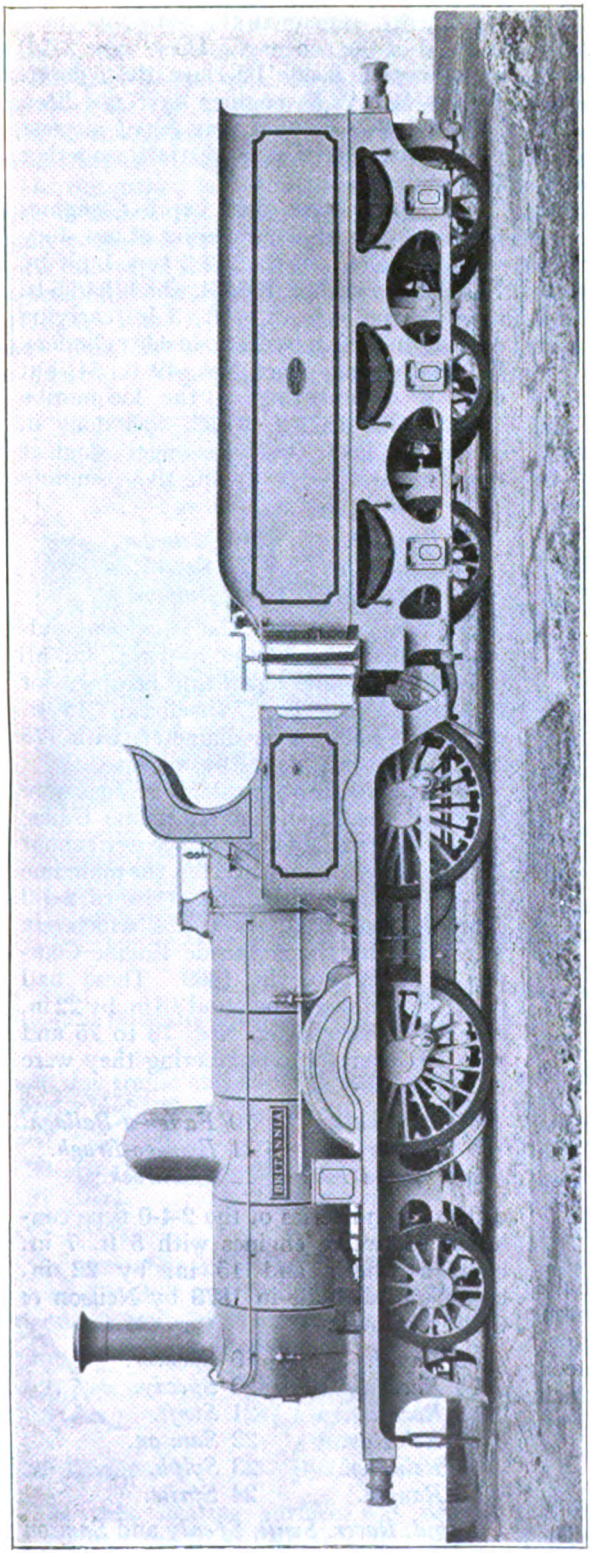

2-4-0 LOCOMOTIVE No. 26, "BRITANNIA."

Built by Beyer Peacock & Co., 1880. Coupled Wheels, 5 ft. diam. Cylinders 16 in. by 22 in.

rise for 8½ miles, the last 2½ of which are at 1 in 60. From the summit near Woodlawn to Oranmore is an almost steady fall, broken by two or three short level stretches, the steepest bits being at 1 in 150. The last 5¼ miles to Galway are easy.

Before describing the locomotives, mention may be made of the main-line "express" trains, as they existed in 1880. The M.G.W.R. made no pretence of fast running, even as speeds went in those days, and there was nothing of the "road-hog" in its composition. The trains started and arrived with commendable punctuality and its Irish patrons seemed to be satisfied. The main-line day started with an 8.15 a.m. down "express" from Dublin, which ran 15 miles to Maynooth in about 33 minutes, and then put in five more stops between Maynooth and Mullingar, where it arrived at 10.27; distance 50¼ miles, total time 2 hr. 12 min. This train really served as a feeder to the "limited mail," and, in addition, carried passengers of all three classes at ordinary fares, whereas the "Limited" conveyed first and second class only at extra fares. The "Limited" itself left Broadstone at 9 a.m., but being a heavier train required 35 min. for the 15 miles run to Maynooth, after which it stopped at only two stations and reached Mullingar at 10.53 a.m. From there it sauntered to Athlone, 27¾ miles, and got there at 12.8 p.m., finally arriving at Galway at 2.15 p.m. Its "rush" across Ireland required 5¼ hours for a distance of 126½ miles. But in those

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days the "Limited" was not the best train; this honour belonged to the 7.30 p.m. down evening express, which reached Galway in 5 hours. It was slower by four minutes to Mullingar and then ran to Athlone in one hour with one stop at Moate. The up "Limited" left Galway at 11.30 a.m. and arrived at Dublin at 4.40 p.m. The 50¼ miles section from Mullingar to Broadstone required 1 hr. 55 min. with three stops, of which the final 15 miles burst from Maynooth took 38 min., but this, I believe, included a ticket-collecting stop.

There were, however, a number of restrictions which materially affected the speeds. The engineers who constructed the railway found the Royal Canal in existence, and as the railway company had bought the canal, they thoughtfully followed the towing path in constructing the line, thereby introducing a number of sharp curves. All trains passing over the Lucan, Leixlip and Hill of Down curves, and all up trains approaching Maynooth and Blanchardstown stations were rigorously restricted at all these points to a speed not exceeding 12 miles per hour, so that their chances of good running were few. The best average speed, such as it was, about 30 m.p.h., was attained between Mullingar and Athlone, but west of Ballinasloe the long single line and severe gradients precluded fast running, at least in those days. It should also be added that there was a speed restriction of 12 miles per hour over the Shannon bridge at Athlone.

The passenger engines were suited to the trains, and of small size. They always had names in addition to numbers, and in the early days many of them responded to the sporting proclivities of the Irish people in bearing the names of celebrated racehorses, such as *Eclipse*, *Voltigeur*, *Harkaway*, *Birdcatcher*, &c., but their doings as racers did not correspond. Most of these engines had been built by W. Fairbairn & Sons, of Manchester, and R. B. Longridge & Co., of Bedlington, Northumberland, but there were seventeen passenger engines of various classes which had been built between 1847 and 1857 by an Irish firm, Messrs. Grendon & Co., of Drogheda. When the racehorses and others had disappeared, there arose a new type, which with modifications and enlargements, remained the standard until the end of the century. These were 2-4-0 engines with inside bearings throughout. As the M.G.W.R. engines have not been recorded elsewhere, it may be of interest to give some particulars of them, together with the names.

The first main line express engines which come within the period of my story were "singles" of the 2-2-2 type built by R. & W. Hawthorn, 1862-3, which had 6 ft. 6 in. driving wheels, 4 ft. 3 in. carrying wheels, and 15 in. by 22 in. inside cylinders. Originally, they were Nos. 49 to 54, but after a renumbering of the locomotive stock about 1871-2, which was done in order to keep the passenger engines together as Nos. 1 to 48, these engines came into the list as follows:—

43 *Leinster.*	46 *Munster.*
44 *Ulster.*	47 *Viceroy*
45 *Queen.*	48 *Connaught.*

The frames were of the double sandwich type with outside bearings for all wheels and additional inside bearings for the driving wheels. Wheelbase, 15 ft. 6 in., and boiler 4 ft. diameter, with 175 2-in. tubes.

About 1870 the above single engines were taken off the important main line trains, though they remained in service until about 1879. They were replaced on the main line "fast" trains by the first series of 2-4-0 engines mentioned above, of which six were built by the Avonside Engine Company, of Bristol, in 1869. These had 6 ft. 1 in. coupled wheels and 16 in. by 22 in. cylinders. Originally, Nos. 73 to 75 and 8 to 10, after the renumbering they were as follows:—

7 *Connemara.*	10 *Faugh-a-Ballagh.*
8 *St. Patrick.*	11 *Erin-go-Bragh.*
9 *Emerald Isle.*	12 *Shamrock.*

The second series of the 2-4-0 type consisted of twelve engines with 5 ft. 7 in. coupled wheels and 15 in. by 22 in. cylinders, all built in 1873 by Neilson & Co., as follows:—

13 *Rapid.*	19 *Spencer.*
14 *Racer*	20 *Speedy.*
15 *Rover.*	21 *Swift.*
16 *Rob Roy.*	22 *Samson.*
17 *Reindeer.*	23 *Sylph.*
18 *Ranger.*	24 *Sprite.*

Rapid, *Racer*, *Swift*, *Speedy* and *Samson*

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were somewhat in the nature of misnomers, but it is now too late to raise objections. They were apparently not intended for the faster trains, but were used on the slower main line services and on the Sligo and Mayo lines.

Having picked out the names beginning with R and S, the locomotive authorities again consulted the dictionary, and tried A for the next series of 2-4-0 passenger engines built by Dübs & Co., of Glasgow, in 1876. Why A came after S, I don't know, for I never consulted a dictionary in Ireland. The new engines were for main line traffic and had 5 ft. 8 in. coupled wheels and 16 in. by 22 in. cylinders. They were :—

30 *Active.*	33 *Arrow.*
31 *Alert.*	34 *Aurora.*
32 *Ariel.*	

Six somewhat similar but larger engines, having 5 ft. 8 in. wheels and 16 in. by 22 in. cylinders, were built by Beyer, Peacock & Co. in 1880-1, as follows :—

2 *Jupiter.*	26 *Britannia.*
3 *Juno.*	36 *Empress of Austria.*
25 *Cyclops.*	37 *Wolfdog.*

The tube heating surface was 683·5 sq. ft., and the total 770·3 sq. ft.; grate area, 15 sq. ft.; and pressure, 130 lb. Weight in working order, 32 tons.

By this time the dictionary had possibly been mislaid or fallen to pieces, and other methods of selecting names were employed. Nos. 2, 3 and 25 took the names of the previous engines which had borne these numbers. *Britannia* appeared at the same time as three new goods engines, 97 *Hibernia*, 98 *Caledonia*, and 99 *Cambria*. No. 36 was named in honour of the Empress of Austria, who used to visit Ireland occasionally for hunting, and, being a sportswoman, was popular in the country. *Wolfdog* was new to the Midland Great Western, and the original probably belonged to somebody who got him on the list, but whether he was in reality a foxhound is not known—very likely he was.

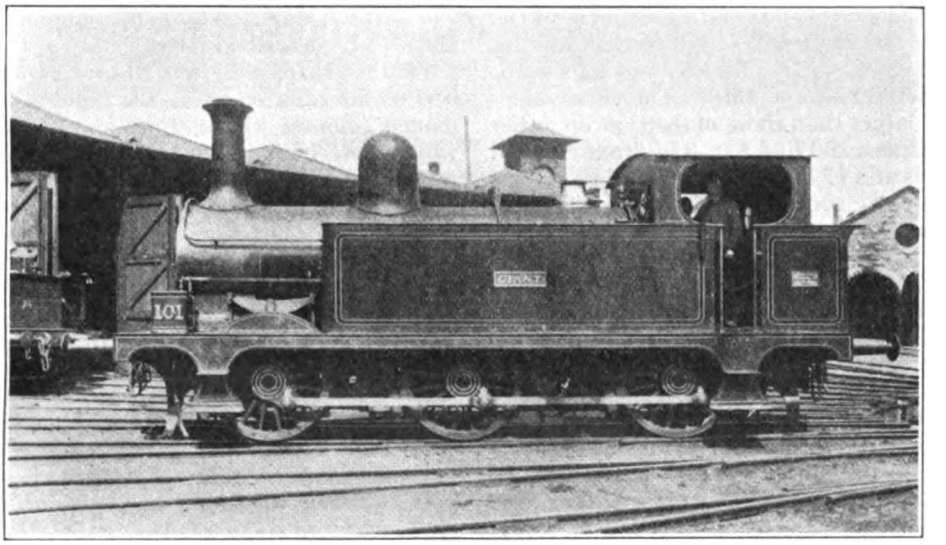

Photo.] **0-6-0 TANK ENGINE No. 101, "GIANT."** [*Loco. Publishing Co. Ltd.*
Built at Broadstone Works, 1881. Coupled wheels, 4 ft. 6 in. diam. Cylinders 18 in. by 24 in.

There were only three passenger tank engines on the line, that is if they were used for passenger trains. These were Nos. 27 *Bee*, 28 *Elf* and 29 *Fairy*, of the small 2-2-2 type with well tanks, of which a considerable number were to be found on various Irish railways. The frames and bearings were inside, the design being that of W. Fairbairn and Sons of Manchester, who built them in 1851. The single driving wheels were 5 ft. 1 in. in diameter, and the cylinders 11 in. by 15 in. They had been rebuilt at Broadstone in

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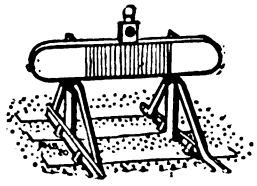
1875–6, with the addition of saddle tanks, which extended the full length of the boiler from the front of the smokebox to the cab. These engines, within my own recollection, were generally to be seen either standing in Broadstone engine shed or doing nothing in particular outside, but I was told that they were used for the officials' special saloons. They had not the usual brass figures on the splashers, the numbers being painted on the buffer beams only. They were replaced in the list by new 2–4–0 engines built in 1897, but were still retained in service for at least two or three years later, possibly more.

The goods engines until 1876 were of the mixed traffic 0–4–2 type, so beloved in Ireland, mostly by Neilson and Dübs, but the later ones of 1867–1873 were somewhat larger than those of the type on other Irish lines, and had 5 ft. 3 in. front coupled wheels and 17 in. by 24 in. cylinders. They were all completely reconstructed at Broadstone as 0–6–0 engines from about 1885 onwards, after which I doubt whether much, if anything, of the original engines remained. The first 0–6–0 engines were Nos. 86 to 95, built by R. Stephenson and Company in 1876, also with 5 ft. 3 in. wheels and 17 in. by 24 in. cylinders. The latter were named after animals, birds and insects beginning with B, but it is only fair to the locomotive department to add that the insect engine was *Butterfly*. Four heavier 0–6–0 engines, Nos. 96 to 99, were built in 1880 by the Avonside Engine Company of Bristol. These had 4 ft. 9 in. wheels and 18 in. by 24 in. cylinders, and were the only goods engines on the line which retained their original features and were not reconstructed before the end of the 19th century.

Six 0–6–0 goods engines, Nos. 49 to 54, named *Marquis*, *Viscount*, *Baron*, *Regent*, *Duke* and *Earl*, were built at Broadstone works in 1879–1880, and appear to have been the first completely new engines built there. These had 5 ft. 1 in. wheels and 18 in. by 24 in. cylinders. In 1899 they were rebuilt and assimilated with the "standard" goods engines of 1885, to be described later.

Finally, there were four heavy banking 0–6–0 side tank engines, Nos. 100 to 103, named *Giantess*, *Giant*, *Pilot* and *Pioneer*, which were built in 1881–2 at Broadstone works. Another similar engine, 105, *Hercules*, was built in 1890. The wheels were 4 ft. 6 in. diameter and the cylinders 18 in. by 24 in. They were used for shunting at North Wall and for banking goods trains thence up to Liffey Junction. No down goods train from North Wall was allowed to take more than 15 wagons to Liffey Junction without the banking engine. Up goods trains went down the incline with the main line goods tender engines to provide greater brake power than was possible with the tank engines, but the speed was limited to a crawl.

(*To be continued.*)



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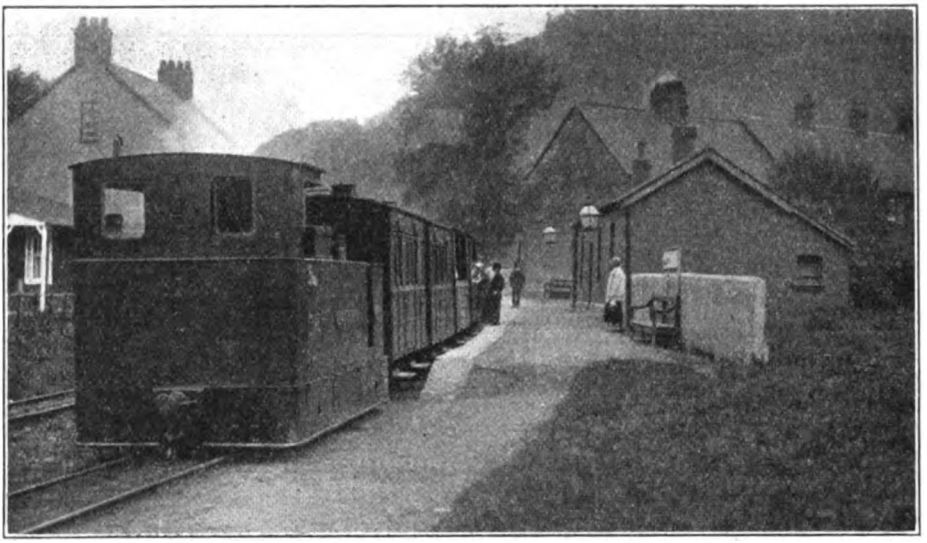

Photo.] **GLYN VALLEY TRAMROAD.** [*H. G. W. Household.*

Glyn Ceiriog Station. Locomotive "Sir Theodore" and train.

The Glyn Valley Tramway.

By H. G. W. HOUSEHOLD.

THE Glyn Valley Tramway connects Chirk, a country town in the county of Denbigh, with Glyn Ceiriog, a picturesque little place up the valley of the River Ceiriog. The gauge of the line is 2 ft. 4½ in., and its total length is 8¾ miles. Passenger traffic is only operated over the 6½ miles between the two places mentioned, but the tramway continues for a further 2¼ miles up the Ceiriog valley above Glyn Ceiriog to large stone works belonging to the Ceiriog Granite Co. Ltd.

The 6½ miles between Chirk and Glyn Ceiriog formed the original section of the tramway; this was opened in 1873 for both passenger and goods traffic, worked by horses. In 1888 the line was to some extent rebuilt, the extension to the stone works was added, and steam traction was introduced.

The carriage of stone from the Ceiriog Granite Company's works forms the chief traffic of the line now, but there is also a useful traffic in slate from several quarries at Glyn Ceiriog. Slate quarries—those at Glyn in this case—led to the building of the original tramway, as in the case of many other light railways in Wales. There is a fair passenger traffic, for the line has decided scenic attractions, and moreover Glyn Ceiriog, though a small place, is one well patronised by visitors in holiday time, while Dolywern, which the line serves, has a good hotel. The country around both provides good fishing and some beautiful walks.

There is a summer service of four passenger trains each way daily, with an extra train from Glyn Ceiriog to Chirk on Wednesdays and Saturdays. The journey occupies 40 minutes either way. In the summer cheap day return tickets are issued. Most trains are mixed, carrying down stone or slate or returning empties, but some trains for mineral traffic only are operated.

The line for the greater part of its length runs along the side of the public road, close by the River Ceiriog. At Glyn Ceiriog the passenger station and goods yard are in the company's own ground. The passenger station consists of a platform and station buildings, running-round loop and a siding leading to a turntable and locomotive shed, now

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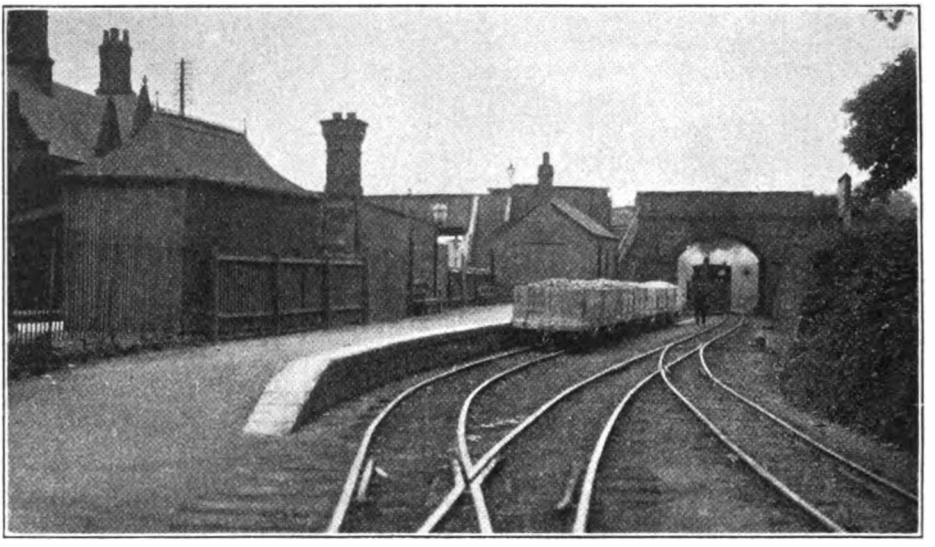

Photo.] **CHIRK STATION.** [*H. G. W. Household.*

derelict. The goods yard is distinct from the passenger station, and is separated from it by a level crossing. On leaving the station yard in the direction of Chirk the line runs into the street, and is joined by the branch from the slate quarries. This branch runs along the streets, through the village. Soon after leaving the village the line crosses the river by a girder bridge alongside the stone bridge carrying the road, and then rejoins the road and follows it to the next station, Dolywern. This station also stands in the company's private ground, and has a siding and waiting shed, but no platform. Just beyond the station the line again crosses the river, and then joins the road. At Pontfadog (2¼ miles from Glyn) the tramway runs along the road through the village, and the station is merely a shed and nameboard on the opposite side of the road to the train.

Beyond Pontfadog the route is very picturesque, the river is close by on the right, and the well-wooded side of the valley comes steeply down to the road on the left. The trees completely overhang the road for some distance here. Curves are sharp on this section, and our train of four carriages, 13 loaded wagons and a brake van, had many twists in it at times. The next station, Castle Mill, consisted solely of a nameboard on the bank at the side of the road where a small turning led up the side of the valley. Castle Mill forms an excellent starting place for excursions on foot in this beautiful valley, and I heard tell that there were fine blackberries to be found in the lanes.

Beyond Castle Mill the fire of our locomotive was made up vigorously in preparation for the stiff climb beyond the next station, Pontfean—to the great discomfort of those passengers who were endeavouring to enjoy the scenery from the open carriages on the train! Pontfean station again consists solely of a nameboard at the roadside; there is not even a sign of a human habitation near by. It is no doubt provided because the line quits the road here, crossing it on the level and climbing up the side of the valley through the woods. Up this incline (1 in 40) the locomotive was throwing out live cinders into the woods around; having learnt my lesson once I kept well inside the carriage! On leaving the woods the line curves sharply round in a deep cutting, and begins to descend. It passes under a footbridge and a road bridge, joins the top of the cutting of the Great Western Shrewsbury-Chester main line, and quickly descends to its terminus at Chirk, which is at the level of, and alongside, the main line station.

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Particulars—

Builder's Name.	Heating Surface (Sq. Ft.)			Boiler Pressure.	Diameter of Driving Wheels.	Cylinders Diameter.	Cylinders Stroke.
	Tubes.	Firebox.	Total.				
Beyer, Peacock & Co.	242 sq. ft.	29 sq. ft.	271 sq. ft.	140 lb. sq. in.	2 ft. 6 in.	10½ in.	16 in.
Baldwin Locomotive Co.	No particulars.			140 lb. sq. in.	2 ft.	8 in.	12 in.

The station at Chirk has a platform and station house, and beyond there are sidings, carriage shed, a siding for the transfer of goods to the Great Western, and a locomotive shed. The line from Glyn Ceiriog to the stoneworks is wholly on private ground. It follows the river closely, crossing it in one place, and is very pretty all the way along. The Ceiriog Granite Company have a locomotive of their own, and work their own line joining the quarries at Hendre (still further up the valley) with the stoneworks.

The Glyn Valley Tramway owns four locomotives, named *Sir Theodore*, *Dennis*, *Glyn* and *Baldwin*, all of the side-tank type. They are smartly painted in black, with red and white lining and red and gold lettering *Sir Theodore* was built by Beyer, Peacock & Co. at Gorton in 1888, when the line was first opened for steam traction. *Dennis* and *Glyn* are of the same class, and were built by the same firm in 1890. These three locomotives have wheels, cylinders and motion totally enclosed, after orthodox "tram" locomotive fashion. The fourth engine, purchased a few years ago, is a 4-6-0 of the War Department type built by the Baldwin

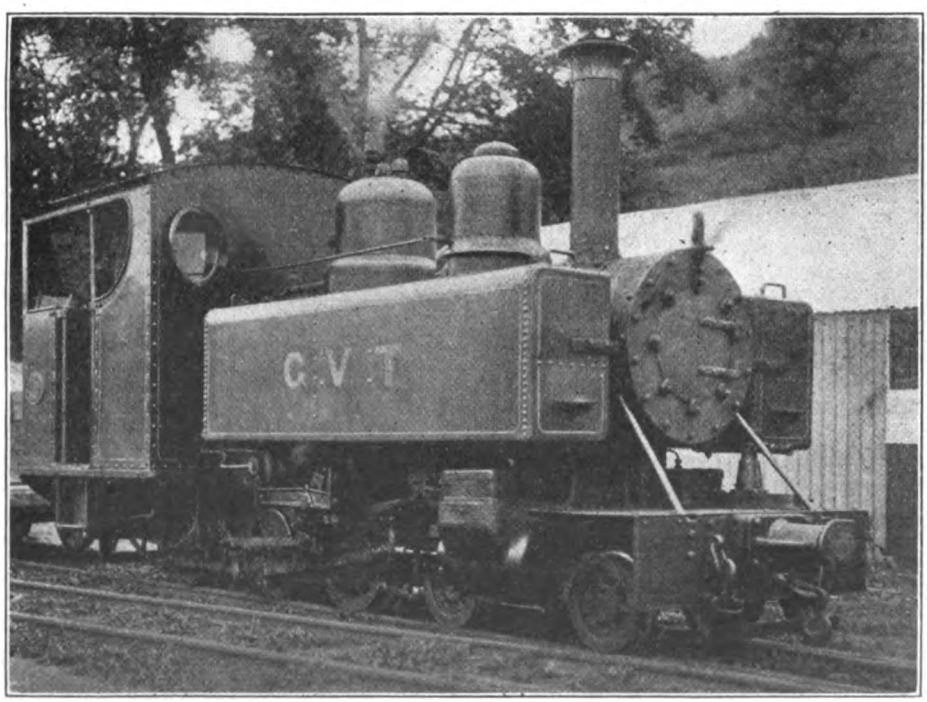

Photo.] GLYN VALLEY TRAMWAY. [*H. G. W. Houschold.*

4-6-0 Tank Locomotive built by the Baldwin Locomotive Works.

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Locomotive Works, Philadelphia, in 1917. The American locomotive has, of course, outside cylinders and Walschaert valve gear, and forms a complete contrast to the Gorton engines with their closed-in motion. The English locomotives are more powerful than the American one and, it appeared, better built.

The passenger carriages, 14 in all, are of two types. First and third-class composite carriages and third-class semi-open carriages with transverse seats. All run on four wheels only. The open carriages are painted green, and the others green with buff-coloured panelling and black lining, both having red and gold lettering. All rolling-stock is fitted with a central buffer and link couplings.

There are many open goods wagons running on the line, but the majority of these belong to the Ceiriog Granite Company. Goods stock is fitted with the usual pin-down type of brake. There is no continuous brake in use on the line.

NAMED LOCOMOTIVES, L.N.E.R.

In view of the fact that we have recently given particulars of the new 4-6-2 and 4-4-0 locomotives on the L.N.E.R., and the 4-4-0, 4-4-2 and 4-6-0 engines on the G.C. section, besides mentioning No. 8900 *Claud Hamilton* on G.E. section (No. 3990 *Henry Oakley* may be added for the G.N. section), we complete the matter by the following list of N.B. section named locomotives compiled by Mr. S. Watson and Mr. Eric Maxwell.

Two errors crept into the list given on page 213 of the March RAILWAY MAGAZINE. No. 6378 should be named *Bailie Macwheeble*, and No. 6392 *Malcolm Graeme*.

"GLEN" SERIES, CLASS K, 4-4-0.

9034	*Glen Garvin.*	9298	*Glen Shiel.*
9035	,, *Gloy.*	9307	,, *Nevis.*
9100	,, *Dochart.*	9405	,, *Spean.*
9149	,, *Finnan.*	9406	,, *Croe.*
9153	,, *Fruin.*	9407	,, *Beasdale.*
9221	,, *Orchy.*	9408	,, *Sloy.*
9241	,, *Ogle.*	9490	,, *Dessary.*
9242	,, *Mamie.*	9492	,, *Gour.*
9256	,, *Douglas.*	9493	,, *Luss.*
9258	,, *Roy.*	9494	,, *Loy.*
9266	,, *Falloch.*	9495	,, *Mallie.*
9270	,, *Garry.*	9496	,, *Moidart.*
9278	,, *Lyon.*	9502	,, *Fintaig.*
9281	,, *Murran.*	9503	,, *Arklet.*
9287	,, *Gyle.*	9504	,, *Alladale.*
9291	,, *Quoich.*	9505	,, *Cona.*

GOODS SERIES, CLASS C, 0-6-0.

9176 *French.*	9647 *Albert.*
9605 *St. Quentin.*	9648 *Mons.*
9608 *Foch.*	9650 *Haig.*
9611 *Allenby.*	9657 *Plumer.*
9612 *Ypres.*	9659 *Gough.*
9615 *Verdun.*	9660 *Horne.*
9620 *Rawlinson.*	9661 *Ole Bill.*
9621 *Monro.*	9662 *Birdwood.*
9627 *Petain.*	9666 *Marne.*
9628 *Byng.*	9673 *Maude.*
9631 *Aisne.*	9676 *Reims.*
9643 *Arras.*	9682 *Joffre.*
9646 *Somme.*	

"ATLANTIC" SERIES, CLASS H, 4-4-2.

9868 *Aberdonian.*	9879 *Abbotsford.*
9869 *Bonnie Dundee.*	9880 *Tweeddale.*
9870 *Bon-accord.*	9881 *Borderer.*
9871 *Thane of Fife.*	9901 *St. Johnstoun.*
9872 *Auld Reekie.*	9902 *Highland Chief.*
9873 *Saint Mungo.*	9903 *Cock o' the North.*
9874 *Dunedin.*	9904 *Holyrood.*
9875 *Midlothian.*	9905 *Buccleuch.*
9876 *Waverley.*	9906 *Teribus.*
9877 *Liddesdale.*	9509 *Duke of Rothesay.*
9878 *Hazeldean.*	9510 *The Lord Provost.*

"SCOTT" SERIES, CLASS J, 4-4-0.

9243 *Meg Merrilies.*	9419 *The Talisman.*
9244 *Madge Wildfire.*	9420 *The Abbot.*
9245 *Bailie Nicol Jarvie.*	9421 *Jingling Geordie.*
9338 *Helen Macgregor.*	9422 *Kenilworth.*
9339 *Ivanhoe.*	9423 *Quentin Durward.*
9340 *Lady of Avenel.*	9424 *Lady Rowena.*
9359 *Dirk Hatteraick.*	9425 *Kettledrummle.*
9360 *Guy Mannering.*	9426 *Norna.*
9361 *Vick Ian Vohr.*	9427 *Lord Glenvarlock.*
9362 *Ravenswood.*	9428 *Adam Woodcock.*
9363 *Hal o' the Wynd.*	9497 *Peter Poundtext.*
9400 *The Dougal Cratur.*	9498 *Father Ambrose.*
9409 *The Pirate.*	9499 *Wandering Willie.*
9410 *Meg Dods.*	9500 *Black Duncan.*
9411 *Dominie Sampson.*	9501 *Simon Glover.*
9412 *Laird o' Monkbarns.*	9895 *Rob Roy.*
9413 *Caleb Balderstone.*	9896 *Dandie Dinmont.*
9414 *Dugald Dalgetty.*	9897 *Redgauntlet.*
9415 *Claverhouse.*	9898 *Sir Walter Scott.*
9416 *Ellangowan.*	9899 *Jeanie Deans.*
9417 *Cuddie Headrigg.*	9900 *The Fair Maid.*
9418 *Dumbiedykes.*	

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British Locomotive Practice and Performance.

By CECIL J. ALLEN,
M.Inst.T., A.I.Loco.E.

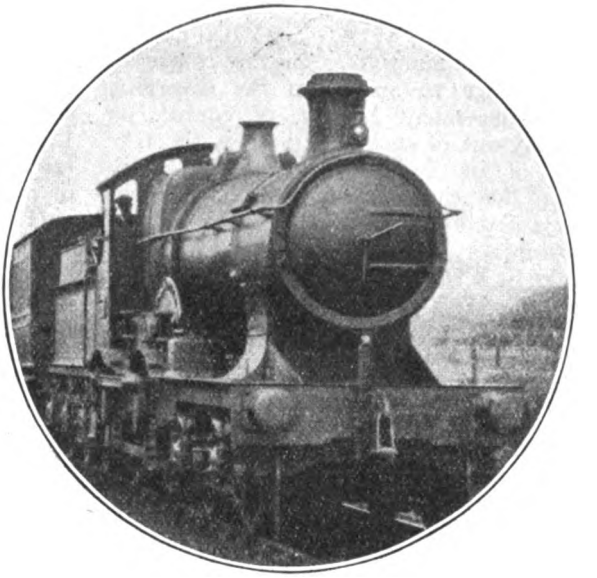

Photo.] [*W. Leslie Good.*

G.W.R. 4-4-0 No. 3306 "FALMOUTH."

A CONSIDERABLE amount of correspondence has reached me in connection with the description of current locomotive performance on the Northern Railway of France, and its comparison with the best work of our own railways, which figured in my article for February last. Unfortunately certain errors, for not all of which I am personally responsible, crept into my data, and my first duty must be that of correcting them. As regards what may be termed "minor" *errata*, on page 127, in the tenth line of the second column, "Creil" was obviously a mistake for "Longueau," 78·2 miles from Paris. On page 137, second column, line 2, by the transposition of a "4" and a "3," "32" became "42"; the actual time from Paris through Creil was, of course, 32 min. 14 sec., and not 42 min. 14 sec., as a reference to the table of runs would at once reveal.

The working allowance of time at Abbeville, referred to in several places as 4 min., is, I find, 3 min., although as a matter of fact the actual stop is always nearer in duration to the former than the latter figure; but this increases the actual working time of the coast-bound boat expresses to 82 min. for the start-to-stop run of 75·7 miles from Abbeville to Calais. On the other hand, the net gains to engine on the runs tabulated were therefore increased by 1 min. in each case, the run of Mr. J. P. Pearson (to whom I am indebted for these corrections) therefore showing a total gain of 7 min. and not 6 min., on schedule time, with a 510-ton train load. The Survilliers summit point, quoted as at the 28-km. post out of Paris, actually adjoins the 27·5-km. post.

Certain other errors cannot, however, be disposed of in so summary a fashion. In the first place, I credited the Nord with a four-track main line from Paris throughout over the 31½ miles to Creil. A correspondent reminds me that, in point of fact, four tracks exist only to the flying junction at Survilliers, or less than two-thirds of that distance. An alternative loop is available *via* Montsoult, but to his knowledge no use is made of this for the working of fast traffic. "There are, therefore," he adds, "only two tracks available between Survilliers and Creil for all the traffic to and from the St. Quentin, Arras and coast directions, which is all the more to the credit of Nord time-keeping."

In connection with this matter of the relative number of stations and junctions on the Nord and the English main line with which it was compared, another correspondent points out with some emphasis that the amount of traffic

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fouling the main lines in the course of its passage to and from the diverging lines—dependent largely, of course, on the lay-out of each junction—is the true test of its capacity to interfere with main line time-keeping; similarly, that the relative importance of each station determines the number of trains which make it a halting-place, with the same result. With this, of course, I am in perfect agreement; the figures I gave were merely in correction of a gross misstatement, and not as a serious basis of argument. For all that, the Nord time-keeping on such exacting schedules, over a route of which between 11 and 12 per cent. alone is four-tracked, is very praiseworthy.

Another error concerns the weight of the latest series of Nord "Pacific" engines, Nos. 3.1201–3.1240 inclusive. Mr. Pearson forwards me a dimensioned official drawing of these locomotives, which gives the total weight of engine *en ordre de marche* as 96·70 tonnes, or 95 tons 3 cwt. Ninety-three tons was the first published figure, and I had not seen anything subsequently to correct it until the drawing to which I have referred. In this connection, as there is no doubt that further details of these remarkable engines will be of interest to readers, I have pleasure in giving herewith, in tabular form, their leading dimensions, in conjunction with those of the leading express locomotive types of each of the British railway groups at the present day.

This brings me to the enquiry of another reader as to the size and shape of the fireboxes on the Nord "Pacifics." While the boiler barrel itself is very short, in comparison to the size of the engine, the firebox is long and narrow; the actual dimensions of the fire-grate are 11 ft. 6 in. long by 3 ft. 3 in. wide, giving an area of 37·67 sq. ft. In this connection I would add that, by reliance on the calculations of my Paris correspondent, which I did not check, an incorrect conversion was given, from kilogrammes per kilometre into pounds per mile, of the French coal consumption. A figure of 17 to 20 kg. per km., as another correspondent reminds me, is not 55 to 65 lb. per mile, but 60 to just over 70 lb. per mile—71 lb. to be exact. If, however, the consumption were reduced in inverse proportion to the

A COMPARISON OF LOCOMOTIVE DIMENSIONS.

	Nord. 4-6-2.	L.N.E.R. *4-6-2.	G.W.R. †4-6-0.	L.M.S.R. ††4-6-0.	S.R. §4-6-0.
Cylinders (h.p.) .. .. in.	(2) 17·3×26·0	(3) 20×26	(4) 16×26	(4) 16½×26	(2) 20½×28
,, (l.p.) .. .. ,,	(2) 24·4×27·2	—	—	—	—
Aggregate piston area sq. in.	¶935·2	942·5	804·2	855·3	660·1
Driving wheels, diam. .. in.	74·9	80·0	80·5	75·0	79·0
Heating surface—					
Tubes .. .. .. sq. ft.	2,422	2,715	1,885	1,717	1,716
Firebox .. .. ,,	219	215	164	176	162
Superheater .. .. ,,	616	525	263	430	337
Total.. .. .. ,,	3,257	3,455	2,312	2,323	2,215
Fire-grate area .. .. ,,	37·7	41·3	30·3	27·0	30·0
Working pressure lb. per sq. in.	‖227	180	225	180	200
Adhesion weight .. tons	55·0	60·0	58·9	59·3	59·2
Weight in working order: Engine .. ,,	95·1	92·5	79·9	79·1	79·9
Weight in working order: Tender .. ,,	64·1	56·3	40·0	40·0	49·2
Weight in working order: Total .. ,,	159·2	148·8	119·9	119·1	129·1
Tender capacity: Coal .. ,,	6·9	8·0	6·0	6·0	5·0
,, ,, Water, gallons	6,930	5,000	3,500	3,000	4,300
Tractive effort (at 85 per cent.)	38,700lb.	29,835lb.	31,625lb.	28,880lb.	25,320lb.

* Gresley type. † "Castle" class. †† Horwich (L. & Y.) type.
§ "King Arthur" class. ¶ Low pressure pistons only.
‖ Pressure in receiver (between high-pressure and low-pressure cylinders) is maintained at 107 lb. per square inch.

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SUMMARY OF FASTEST RECORDED TIMES, PARIS-CALAIS, CHEMIN-DE-FER DU NORD.

Aggregate Distances.		Stations.	Loads on Fastest Runs.	Fastest Point to-Point.		Aggregate Fastest Times.
				Times.	Speeds.	
Km.	Miles.		Tons.	Min. sec.	M.p.h.	Min. sec.
0·0	0·0	Paris	—	—	—	0·00
6·1	3·8	St. Denis	499	6·03	37·7	6·03
10·1	6·3	Pierrefitte	513	2·25	62·2	8·28
14·8	9·2	Villiers-le-Bel	510	3·03	57·1	11·31
19·5	12·1	Goussainville	510	3·15	53·6	14·46
23·6	14·6	Louvres	498	2·34	59·5	17·20
29·7	18·5	Survilliers (summit) ..	498	4·01	57·5	21·21
40·9	25·4	Chantilly	495	5·19	77·8	26·40
50·3	31·3	Creil (slack)*	495	5·03	70·1	31·43
54·2	33·7	Laigneville	495	2·18	62·6	34·01
65·1	40·5	Clermont	513	6·40	61·2	40·41
72·7	45·2	Avrechy	513	4·31	62·4	45·12
79·5	49·4	St. Just	510	4·17	58·0	49·29
87·3	54·2	Gannes (summit)	510	4·55	58·5	54·24
111·1	69·0	Ailly-sur-Noye	495	12·13	71·8	66·37
116·5	72·4	Dommartin..	495	2·40	76·5	69·17
122·0	75·8	Boves	510	2·59	68·1	72·16
126·0	78·3	Longueau (slack)*.. ..	499	2·35	58·1	74·51
130·6	81·2	Amiens (slack)†	499	3·31	49·4	78·22
132·6	82·4	St. Roch	499	2·20	30·9	80·42
137·5	85·4	Dreuil	513	3·24	52·9	84·06
140·0	87·0	Ailly-sur-Somme	513	1·26	67·1	85·32
144·7	89·9	Picquigny	513	2·24	72·5	87·56
151·6	94·2	Hangest	513	3·33	72·7	91·29
157·9	98·1	Longpré	513	3·13	72·7	94·42
162·9	101·2	Fontaine	513	2·38	70·7	97·20
166·7	103·6	Pont Remy..	513	2·01	71·3	99·21
175·4	109·0	Abbeville (STOP)	499	5·55	54·8	105·16
0·0	0·0	Abbeville (START)	—	—	—	0·00
8·1	5·0	Port-le-Grand	498	7·39	39·2	7·39
13·6	8·4	Noyelles	513	3·12	63·8	10·51
18·9	11·7	Ponthoile-Romaine ..	513	2·44	72·5	13·35
23·5	14·6	Rue	513	2·26	71·6	16·01
28·7	17·8	Quend-Fort-Mahon ..	513	2·44	70·3	18·45
33·6	20·9	Conchil-le-Temple	510	2·34	72·4	21·19
39·6	24·6	Rang-du-Fliers	513	3·16	67·9	24·35
44·9	27·9	St. Josse	513	2·51	69·5	27·26
50·9	31·6	Etaples	510	3·19	66·8	30·45
58·3	36·2	Dannes-Camiers	510	4·15	64·9	35·00
64·0	39·7	Neufchâtel (summit) ..	510	4·07	51·0	39·07
69·1	42·9	Hesdigneul	510	2·39	72·5	41·46
72·9	45·3	Pont-de-Briques	510	1·50	78·5	43·36
—	—	Outreau Jc. (slack)* ..	—	—	—	—
79·5	49·4	Boulogne (Tintilleries) ..	510	3·36	68·3	47·12
81·9	50·9	Terlincthun	510	1·32	58·8	48·44
84·2	52·3	Wimille–Wimereux ..	510	1·33	54·2	50·17
94·6	58·8	Marquise–Rinxent ..	510	6·11	64·7	56·28
102·8	63·9	Caffiers (summit)	510	6·21	48·2	62·49
111·8	69·5	Fréthun	510	4·56	68·2	67·45
117·1	72·8	Les Fontinettes	510	2·59	66·4	70·44
118·6	73·7	Calais (Ville)	510	1·37	33·3	72·21
121·8	75·7	Calais (Maritime) (STOP) ..	495	3·19	36·2	75·40

* Slight service slack. † Severe service slack.

Average load behind tender throughout 507 English tons.

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calorific value of the fuel burned, the corresponding consumption of Yorkshire coal would be about 52 to 62 lb. per mile, and of the best Welsh steam coal, as used on the Great Western, 49 to 58 lb. per mile, in the achievement of the feats which were set on record in the February article.

Mr. Pearson has also been good enough to forward to me a summary of the best point-to-point times that he has noted in the course of ten runs with "peak" loads behind the new "Pacifics" between Paris and Calais, together with the loads taken on each occasion quoted, and the mileages in kilometres and tenths, the last culled from the Nord working time-tables, and therefore a more accurate series of mileage figures than those given in my February article. This table should be consulted in conjunction with the profile of gradients between Paris and Calais, published in my February article.

It will be noted that the times tabulated are with trains of 495 gross tons' weight and over only, the average working out at 507 tons behind the tender. Special note should be taken of the work from Pierrefitte up to Survilliers, also of that from Marquise up to Caffiers. Again, the times from Abbeville to Dannes-Camiers, slightly further and harder than from Paddington to Reading, add up to 35 min. exactly, with loads, on most of the occasions included in the summary, of 513 tons. "Some of the figures are amazing," my correspondent concludes; I should be inclined to apply the adjective to the whole of them, rather than merely a part of them.

I have now to mention a letter commenting on the comparison made by Mr. Pearson, and quoted in February, between the running of *Caldicot Castle* on the down Great Western "Limited," during the exchange trials of 1925, and a typical Nord 4-6-2 compound run from Paris to Calais. The letter to which I refer reaches me from Mr. A. V. Goodyear, than whom I know of no writer competent to speak with greater authority on the subject of Great Western locomotive work. Mr. Goodyear quotes Mr. Pearson's statement that "the normal Amiens slack and the disadvantage of being limited to a maximum well under 80 m.p.h. were worth together fully 4 min.," and, commenting on this, he adds: "The inference is that a certain proportion of the allowance of 4 min. was credited to the compound on the assumption that *Caldicot Castle*, on her best run, gained an appreciable amount

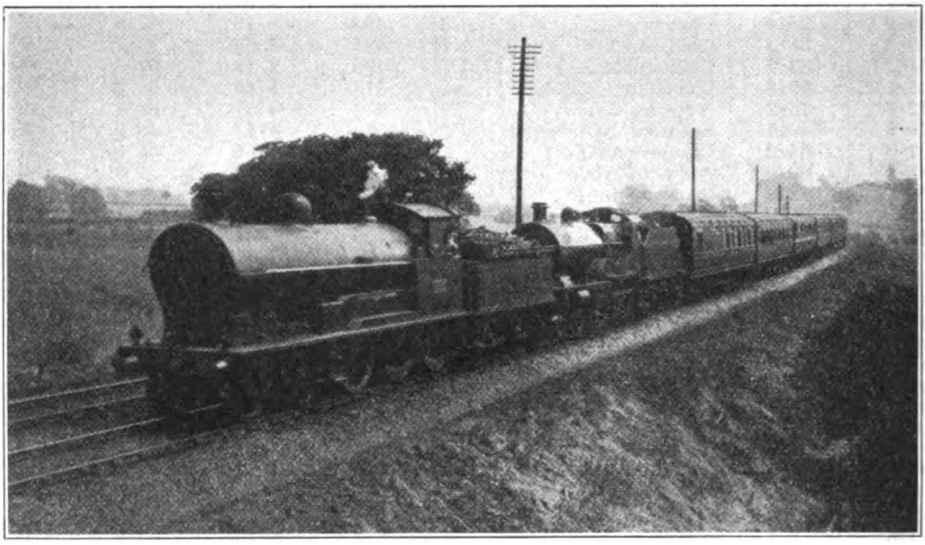

Photo.] [*J. F. Dearden.*

DOWN MANCHESTER AND LIVERPOOL EXPRESS NEAR BLISWORTH, L.M.S.R.

L.N.W. Type 4-6-0 "Hampden" and Midland type 4-4-0 Compound No. 1054.

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of time by exceeding the maximum limit permissible in France. Inspection of the speeds per mile in my log shows that, if the French maximum figure be taken as 74·5 m.p.h., the time thus gained by *Caldicot Castle* did not exceed 9 seconds. The highest speed attained by the latter was actually a shade over 77 m.p.h. in descending the 1 in 222 past Lavington, and this was recorded in your July article. On the easy grades from Whiteball to Exeter, the 18 miles concluding at post 193 were covered in 14 min. 46 sec., at an average speed of 73·2 m.p.h., and the maximum was 76·5 for 2 miles only."

Exeter being incorporated into a daily schedule, which could be adhered to by locomotives of the 'Castle' class in normal weather conditions."

With all respect to the writer, I cannot altogether agree with the reasoning here. As regards high downhill speeds, it would be impossible, in my judgment, to expect London-Birmingham maxima on the constantly winding stretches of the West of England road. I have the liveliest recollections of Springthorpe's brilliant driving of *Lode Star* on the record run with the "Limited" which figured in my December article of

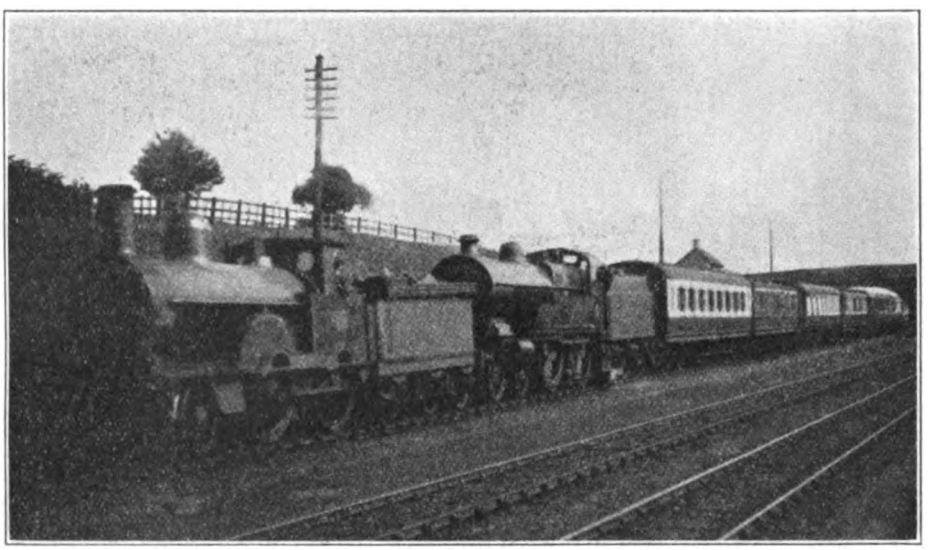

Photo.] [*Henry L. Salmon.*

1.30 P.M. DOWN ANGLO-SCOTTISH EXPRESS, L.M.S.R., NEAR STAFFORD.

L.N.W. 2-4-0 No. 193 "Rocket" and Midland Type Compound 4-4-0 No. 1076.

"Had the requirements of the test permitted the driver to be less mindful of his coal consumption," Mr. Goodyear continues, "and had *Caldicot Castle* been permitted to run as freely on falling gradients as is customary with London and Birmingham expresses, whose average speeds over considerable distances approach the 80-m.p.h. figure, and whose maxima occasionally extend into the 'nineties,' as your own articles have recorded, it is possible that the time of No. 4074 to Exeter might have been reduced by as much as 3 min. There is nothing except the question of economics to prevent the approximate times of No. 4074's run to

1921, but I am bound to say that there were certain downhill sections over which (to quote a correspondent writing on similar experiences on the Nord) "I was not sure whether to be alarmed or exhilarated"! This applied particularly to the running from "122¾" to Cogload, and from Whiteball to Exeter, where the pace was a trifle "hot," even to so hardened a traveller as myself. Over nine minutes were gained on this run between Castle Cary and Exeter alone, over which section the time (with a load 100 tons lighter) was 2 min. 12 sec. less than that of *Caldicot Castle*. Let me hasten to add, however, that the regulation slacks were

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observed with exemplary caution, as I stated at the time.

The downhill running of *Caldicot Castle* in the "exchange" does not therefore seem capable of any considerable expedition, consistently with comfort. On the other hand, the uphill running of the same engine is not easily imitated in normal practice, as witness the rarity with which her outward time to Savernake is so much as approached in the ordinary course, or her ascent from Taunton to Whiteball. Taking these two considerations together, it does not, therefore, seem feasible to me that the times of *Caldicot Castle* from Paddington to Exeter, on her historic run, could be observed by "Castle" class engines, correspondingly loaded, as a practical day-to-day proposition. The run in question was a run by an engine in perfect condition, handled by a crew who were not only experts in every sense of the word—and had been selected for that purpose—but who were stimulated, to a degree never paralleled in ordinary running, by the peculiarly sporting conditions in which their run was being made.

Reverting to Mr. Pearson's comparison, I find that the actual proportion of the "4 min." which he credited to limited maximum speeds was roughly 1 min. only. On the showing of Mr. Goodyear even this one minute appears a slight over-estimate, and is, therefore, a minute to the credit of *Caldicot Castle*, in the comparison. As regards the relative difficulty of the work, from the load and grading standpoint, the French engine had to contend with distinctly harder average conditions, as I set out in detail in February. On the trial run *Caldicot Castle* burned 46·8 lb. of coal per mile; the Nord compound burned somewhere between 60 and 71 lb. of the inferior French fuel, or say, as an average, 65½ lb., the weather being reasonably fine. In terms of Welsh steam coal, as I explained previously, the last-mentioned figure comes down to 53½ lb. I am not sure that the 53½ lb. ought not to be still further reduced, in view of the disproportionate tendency of the inferior fuel to give trouble on the fire-grate with clinker and ash. Times, as we have just seen, give a very slight advantage to the Great Western engine, on an entirely exceptional run, over the French engine, on a normal journey. In weight, of course, the Frenchman tops the "Castle" by 15·15 tons, or 19 per cent., which is a substantial difference; on the other hand, the disparity of 24 tons in the weights of

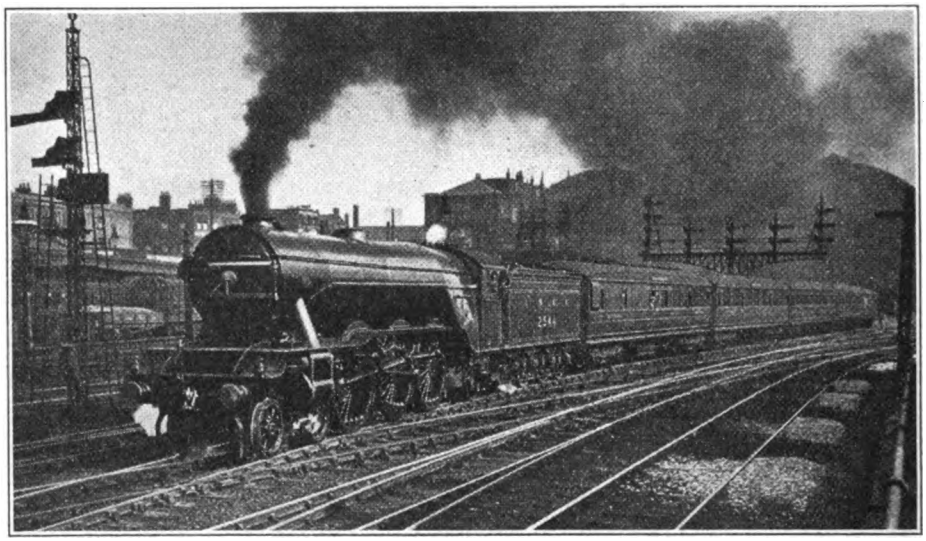

Photo.] [*A. L. P. Reavil.*

EAST COAST EXPRESS LEAVING KING'S CROSS.
4-6-2 Locomotive No. 2544.

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the two tenders in running order ought, by rights, to be added to the French engine's load. The whole comparison is one of deep interest, and one only wishes it were possible to carry it further by a direct comparison of work, with, of course, French drivers in charge of the French compounds.

There is but one further letter to quote; it sounds a note differing somewhat from the tenor of those already dealt with. "Railwayacs," I read with concern, "are making themselves ridiculous in the eyes of the general public by their frantic glorification of mere speed as the one essential of a good train service. The frightful experiences of travellers between Calais and Paris, of jolting and swerving make the ordinary person shudder at the thought of 20 minutes—am I right?—being taken off the schedule time of the boat trains between these two towns. The average traveller greatly prefers the crawling "Riviera" express on the Great Western Railway, which sails along like a yacht on a calm sea, even though its average is only 53 or 54 miles per hour, to trains which hurtle along at a speed and with a discomfort which makes the journey a misery instead of a delight. Twenty minutes off a journey of 3¼ hours—nonsense! Rather let the Chemin de Fer du Nord concentrate on a well-laid track, smooth running, clean carriages and punctuality. These things appeal to travellers more than speed competition."

As doubtless included amongst the "railwayacs" of such mischievous propensities, I feel that it is up to me to reply to this weighty indictment. In view of the fact that my monthly articles are entitled "Locomotive Practice and Performance," it is hardly possible to avoid dealing at times with the speeds of express trains, and in that respect readers will, I feel sure, appreciate my difficulty.

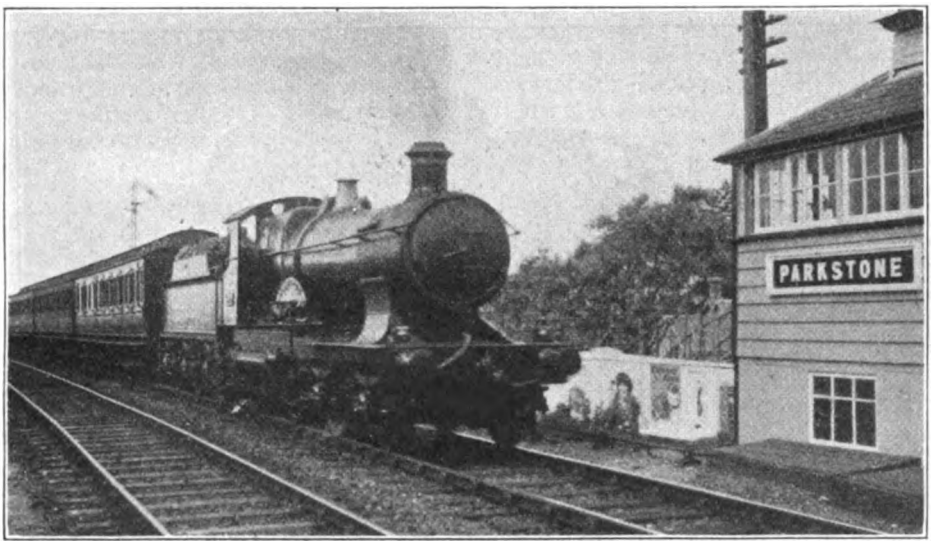

Photo.] [*A. D. Hayman.*

BRISTOL-BOURNEMOUTH SPECIAL PASSING PARKSTONE.
G.W.R. 4-4-0 No. 3400 "Winnipeg."

It is not that I could not expatiate at length on other matters that "appeal to travellers"—the methods and *ménus* of our restaurant cars, for example, would furnish a topic both palatable and profitable—but the limitations of my title confine me, so far as train services are concerned, to the question of speed. I have searched recent articles for what might rightly be described as "glorification" of this non-essential, for the sake of mere speed alone; and the search has failed to reveal any "frantic glorification" that I can trace. Incidentally, very little reference was made to high downhill speeds in my description of the work of the

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Nord locomotives; the subject of eulogy was principally the extraordinary uphill work, almost entirely at speeds below 60 m.p.h., and yet, of course, exceedingly high in proportion to the loads hauled and the gradients surmounted. Speed of transit, coupled with efficiency of operation —as witnessed to by heavy load haulage on moderate fuel consumption—is (I am open to correction) the aim of express locomotive constructional practice; and where magnificent locomotive performance has testified to the achievement of these aims, it has received, and will continue to receive "glorification" in these columns. *Palmam qui meruit ferat.*

that I was able to detail over the Nord in February. There are journeys which I have made over most of the British main lines—with the possible exception of the Great Northern and the London and North Western—wherein the "yacht on a calm sea" has given place to sensations more akin to the Wembley "Witching Waves"; and to these even the famous train cited by the letter-writer has not always been a stranger, as I have already mentioned. Travelling of this character is certainly not the monopoly of the Chemin de Fer du Nord.

I wish I could afford to be as contemptuous of mere time as the writer of

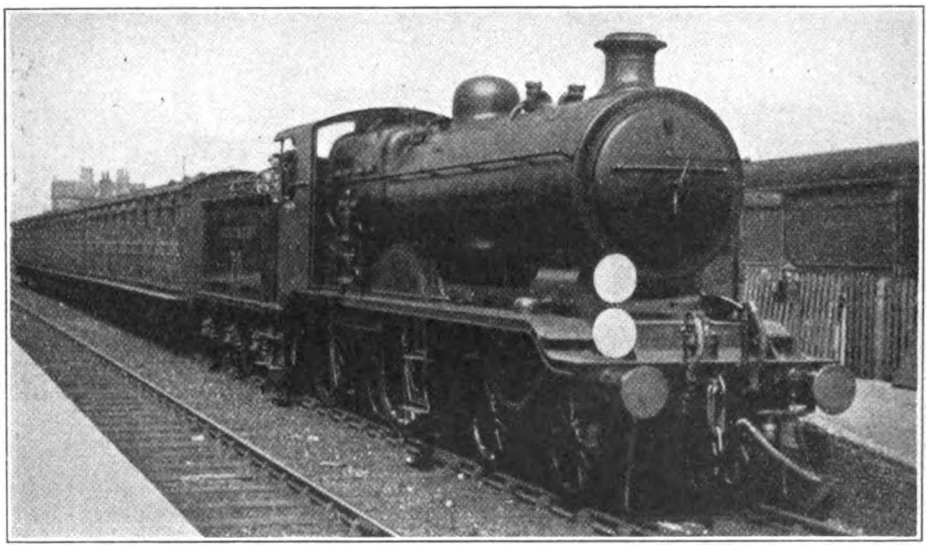

Photo.] [*W. Kille.*

BOGNOR-VICTORIA EXPRESS, S.R., AT BARNHAM JUNCTION.
L.B.S.C. 4-4-0 No. 70 (Rebuilt "B.4" Class).

Before leaving the subject, may I add that the writer of the letter has been somewhat unfortunate in his choice of both a *simile* and an example? The burden of the public utterance which my February article sought to correct, not by a glorification of mere speed, but by a setting on record of the facts, was that British railway speeds are *higher* than those of the Northern Railway of France. The burden of the letter of a correspondent last discussed in this article is that the very express train whose leisurely motion is picturesquely likened to "a yacht on a calm sea" made a journey faster than any

the letter. "Twenty minutes off a journey of 3¼ hours—nonsense!" he exclaims. How, I wonder, does he imagine that the speeds of the present day have been reached if it has not been by the practical application of *paulatim* as a motto? The cutting of times by accelerations of 20, 10 or even 5 minutes have led to the present timing of his favourite flier to the West, and it therefore the more ill becomes him to anathematise a railway which, under no spur of competition, offers to the public times still further expedited. Let me add, for his comfort, that the accelerated Calais-Paris express will be a

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"Pullman Limited" train, first-class only, at extra fare (and rightly so), so that passengers who fear the "swerving" and the "jolting" will have themselves alone to blame if, at enhanced cost of transit, they suffer the "frightful experiences" entailed. For all that, I do not fancy that the new train will lack patronage.

Even in regard to punctuality, the French Nord could, I think, give points to some of our British lines at the present time. It is, perhaps, a paradox, and yet undoubtedly a fact, that the tightest times, whether running times or station times—unless unreasonably or impossibly tight—breed, as a general rule, the smartest and most punctual working. The Nord suffers from its international connections, and to a certain extent is at the mercy, on the one hand, of trains which have travelled half-way across Europe, and, on the other, at that of cross-Channel boats, in the matter of its punctuality; for this it cannot be held responsible. But the punctual running of its express trains not so affected would bear favourable comparison with that of the "yachts" of our own "calm seas," whose unfortunate tendency, on some lines, to become *unduly* becalmed is a source of concern to those to whom time is, after all, an object. Readers who have a closer familiarity than myself with the present working of the Nord, and to whom I have shown this letter, not only agree with me *in toto* as regards the question of punctuality, but also object to the imputation as to lack of cleanliness in the rolling-stock of the Nord boat expresses. The track of the French Nord I do not propose to commend, although it is constantly in course of improvement; but this is hardly the fault of the locomotives. So far as concerns the province of these articles, therefore, even at the expense of appearing "ridiculous," I stand quite unrepentant in the matter of having set on record some of the finest locomotive work in Europe.

Very little space, I fear, has now been left in which to deal with the current British locomotive performance, and I must therefore confine myself to details of a few recent runs, by way of bearing on the discussion, behind the Midland compound engines of the L.M.S. Railway. These runs are exclusively over the late London and North Western main line, and are published with a view to showing, if possible, that much of the loss of time alleged against them on Western Division trains appears to be more the fault of handling than of design. An engine of this size and power cannot be expected to work miracles; and the journeys which follow by no means need be taken as an argument that nothing more powerful than the Midland compounds are required for the heaviest main line duties of the L.M.S. But for working the moderate train formations of the Birmingham service at high speeds they should be an ideal proposition, as speedy as the "Georges," and, if driven as they have been designed to work—full compound, with a wide open regulator and a short cut-off—appreciably lighter on coal.

My first run was on the 6.55 p.m. down. Incidentally, the construction of the new kitchen car sets was justified as a means of serving meals to an indefinite number of passengers in the trains; but one now finds in this train, as well as in the formation of the 5.55 p.m. down Liverpool non-stop, the 6.5 p.m. down Manchester and other expresses, an additional 12-wheeled restaurant car, so that at least 50 tons out of the tare train weight is given over entirely to cooking and the service of meals, and provides no seating accommodation. No. 1169 touched 59 m.p.h. at Willesden and 64 at Watford, falling to 53 at Hatch End and 50 at Tring; maximum at Cheddington was 68 an hour. After that we fell to 53 an hour at Roade, but followed this with some of the best work on the journey by touching 68 at Weedon and going up to Kilsby at a minimum of 57½ m.p.h. Very easy travelling on to Rugby was succeeded, after the station slack, by a top speed of 68 m.p.h. at Brandon; then came a signal check to 40 m.p.h. at Coventry. From this we accelerated up the 1 in 330 to Beechwood Tunnel to 53½ m.p.h., and, touching 69 at Hampton, reached New Street in 120 mins. 45 secs., or 119 min. net—a very fair run, but with no time to spare.

Compare with this the first run of No. 1157. The start, with 25 tons less load, was slower, but after that the work was remarkable. Touching 61½ m.p.h. at Willesden, we went unwaveringly up the

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1 in 330 past Hatch End at 59 m.p.h., and touched 66 at Watford; then, after falling to 55½ up the 1 in 330 to Boxmoor, we suddenly commenced to *accelerate* on the continuation of the same grade, until we actually touched the "sixty" line just before breasting the summit. For a 60-ton engine hauling a tender and train of over five times its own weight, this up-grade acceleration was a very astonishing feat. We were unfortunately slacked for signals at Tring, to 45 m.p.h., but quickly accelerated thereafter, and between Cheddington and Bletchley speed was entirely between the limits of 71½ and 75 m.p.h. Then came signals on again, at Wolverton, to 20 m.p.h., and, yet again, to 30 at Roade, although between the checks we accelerated to 57½ m.p.h. up the grade from Castlethorpe. At both Weedon and Hillmorton we were doing 66 m.p.h., with a minimum of 61 on the ascent to Kilsby; then, after slacking to 40 through Rugby, we touched 68 at Brandon, and would have kept, but for ½-min. loss, our schedule time to Coventry stop, despite all delays, were it not for being stopped by signal just outside the station, in 99 min. 20 sec. from Euston. I estimate the net time for the 94-mile journey at 94½ min. net. Single-line

L.M.S. (WESTERN DIVISION) EUSTON—BIRMINGHAM.

Distance.	1119M	1193G	1158M	1157M	Engine, 4-4-0 No.	Distance.	1169M	1157M	1157M	1163M
	30	30	26	34	Load (axles) ..		38	36	36	30
	213	213	185	250	,, (tons tare)		278	257	263	214
	225	225	200	265	,, (tons full)		295	270	275	225
Miles.	m. s.	m. s.	m. s.	m. s.		Miles.	m. s.	m. s.	m. s.	m. s.
94·0	98 30	96 10	10 05	9 30	Euston.. ..	0·0	0 00	0 00	0 00	0 00
	sigs.									
88·6	89 00	87 55	108 20	114 15	Willesden Jn. ..	5·4	9 15	10 05	9 35	10 20
85·9	sigs.	85 20	105 35	111 20	Wembley ..	8·1	12 10	12 40	12 35	—
82·6	79 55	82 25	102 55	108 10	Harrow ..	11·4	15 45	16 00	16 15	8 40
80·7	78 15	80 40	101 15	106 25	Hatch End ..	13·3	17 55	18 00	18 25	10 45
78·0	75 50	78 10	98 50	103 50	Bushey ..	16·0	20 55	20 40	21 15	13 30
76·5	74 20	76 45	97 20	102 20	Watford ..	17·5	22 25	22 00	22 40	15 00
73·0	71 25	73 50	94 15	99 05	King's Langley	21·0	26 00	25 20	26 05	18 35
69·5	68 30	70 55	91 20	95 50	Boxmoor ..	24·5	29 45	29 00	29 35	22 20
66·0	65 35	68 00	88 10	92 30	Berkhamsted ..	28·0	33 40	32 35	33 10	26 15
								sigs.		
62·3	62 00	64 15	84 35	88 30	Tring	31·7	38 05	36 40	37 15	30 35
57·9	57 20	59 25	79 40	83 05	Cheddington ..	36·1	42 30	40 50	41 20	34 50
53·8	53 30	55 20	75 25	78 15	Leighton ..	40·2	46 20	44 10	45 10	38 25
47·3	47 30	48 15	68 10	71 30	Bletchley ..	46·7	52 30	49 30	51 30	44 15
		sigs.						sigs.		
41·6	42 20	42 25	62 10	65 25	Wolverton ..	52·4	58 00	55 45	56 45	49 35
								p.w.c.	p.w.c.	
39·3	40 25	40 30	59 50	63 00	Castlethorpe ..	54·7	60 25	58 50	59 45	51 55
								sigs.		
34·1	36 05	36 15	55 20	58 00	Roade	59·9	66 10	64 50	65 30	57 40
31·2	33 15	33 25	52 30	53 20	Blisworth ..	62·8	69 15	68 30	68 45	60 50
				sigs.						
24·3	27 25	27 20	45 25	44 20	Weedon ..	69·7	75 25	75 00	75 00	67 25
18·7	22 25	22 25	39 50	38 50	Welton.. ..	75·3	80 45	80 25	80 30	73 15
11·4	13 00	13 05	31 00	29 15	Rugby ..	82·6	88 20	87 30	87 40	80 50
10·8	12 00	11 50	30 00	28 15	,, No. 7 ..	83·2	89 10	88 30	88 45	81 55
4·9	6 25	6 20	24 30	22 50	Brandon ..	89·1	94 50	94 20	94 45	88 10
							sigs.	sigs.		
18·9	25 10	20 35	20 20	19 00	Coventry ..	94·0	100 00	100 50	99 55	92 55
	sig. stop							sigs.		
15·4	15 55	16 20	—	16 05	Tile Hill ..	97·5	104 30	8 05	6 35	97 00
13·4	14 10	14 30	—	14 20	Berkeswell ..	99·5	106 35	10 25	8 55	99 15
10·1	11 15	11 25	—	11 20	Hampton ..	102·8	109 45	13 30	12 00	102 35
6·5	8 10	8 20	—	8 15	Marston Green	106·4	113 00	16 35	15 10	106 05
3·8	5 40	5 45	—	5 50	Stechford ..	109·1	115 30	19 05	17 45	109 00
0·0	0 00	0 00	0 00	0 00	Birmingham ..	112·9	120 45	24 10	22 50	114 10

M: Midland 3-cylinder compound. G: "George the Fifth" 2-cylinder simple (*T. J. Hare*).

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working after starting from Coventry, owing to the derailment of a wagon, also hindered the re-start, but we accelerated to 49½ m.p.h. at Beechwood, and ran freely at 71½ an hour past Hampton and Marston Green. Birmingham non-stop in "even time"—113 min.—from Euston would have been easily feasible on this fine run.

But now look at the next journey, with the same engine and practically the same load. Only 54 an hour at Willesden, after a faster start, and the same speed maintained to Oxhey, 64 at Watford, 55½ at Tring, 64½ to 66 all the way to Bletchley, and 69 before Wolverton, where we were slacked for viaduct repairs to 35 m.p.h., 55½ steadily up to Roade, 66 at Weedon, 57½ at Kilsby, 70½ before Rugby, and, finally, 68 at Brandon from a 40-m.p.h. Rugby slack—such running was undeniably quite good, but with the one check only we failed, by 45 sec., to maintain time to Coventry. Coventry to Birmingham was run smartly, with an acceleration to 50 m.p.h. at Beechwood, and a maximum of 70½ at Hampton, in 1¼ min. under schedule time. This gave a total net gain to engine of about 2½ min., but the running fell considerably short of that in the previous week.

Then, at the other end of the scale, I give a run of what has been of all too frequent a kind with the compounds, on the 9.10 a.m. down Birmingham express. With a much lighter train, of only 225 tons, we lost, unchecked, 5¼ min. from Willesden to Birmingham, the only possible palliation being a violent south-westerly wind. Minimum speeds were 55½ m.p.h. at Hatch End, 51 at Tring, 52 at Roade, 54 at Kilsby, and 50½ at Beechwood; and maxima were 61 at Watford, 71 at Cheddington, and 64½ before Rugby. After the runs preceding, it would be difficult to attribute this entirely to the engine; and I could quote other corresponding journeys.

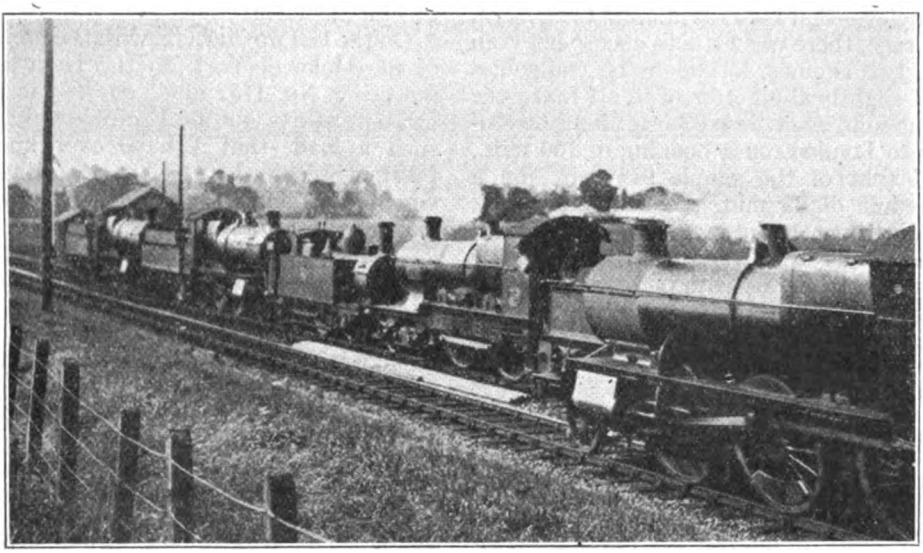

Photo.] [*J. Dearden.*

G.W. LOCOMOTIVES BOUND FOR SWINDON FOR REPAIRS AND OVERHAUL.
Engine of Birmingham-Weymouth Express in Foreground.

Now, very briefly, for three up journeys. I have first of all contrasted the work of a Midland compound and a "George," one on the 2.30 p.m. up, with 125 min. allowed to town, and the other on the 1 p.m., with 120 min., both with Coventry stops and hauling identical loads. Although the compound driver had 3 min. more allowed to Coventry than his rival—22 min. against 19 min.—he made the better start, running at 71½ to 72½ m.p.h. from Marston Green to Hampton, against 1193's 70½ m.p.h. The latter, going over Beechwood at 60 an hour, lost 1½ min. to Coventry—is the 19-minute booking ever

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really attempted nowadays, by the way? —whereas the compound, with a minimum of 66 at Beechwood and a maximum of 75 beyond, would have stopped in 19¾ min. easily, but for paying the penalty of undue haste with a signal stop outside. After leaving Coventry, the going was fairly even to Rugby, No. 1119 attaining 67 an hour beyond Brandon; after Rugby slack, the compound and simple speeds were respectively 49 and 53 m.p.h. at Kilsby, 74 and 75 at Weedon, 61½ on both runs at Roade, 76½ and 80½ at Castlethorpe, 68 and 61½ (preceding a signal check to 40) at Bletchley, 64½ and 59 at Leighton, 57 and 53½ at Tring, and 74 on both runs from Boxmoor to King's Langley—that is to say, taking the general average, there was little to choose between the two engines, although the compound had slightly the better of it. I make the compound's net time 93 min. from Coventry to London, on a booking of 100 min., and that of the simple 94½ min., on a schedule of 99 min. the compound thus gaining over 9 min. in all. In fact, on such running as this, the latter could have made Euston non-stop, without much difficulty, in a net time of 110 min. for the 112·9 miles. No; it is abundantly clear that there is nothing wrong with the engines.

I conclude with two singular journeys on the 4.50 p.m. up. Being very busy on the first, I was not intending to time, but took the start at New Street, and as we were going well at Coventry, I then proceeded to log the rest of the run. It had some strange features. We passed Coventry at 75 an hour, were still doing 68 at Brandon, and reduced to 35 through Rugby. Accelerating splendidly to 53½ m.p.h. up to Kilsby, we touched 68 on the subsequent descent, and then eased so materially as to pass Weedon at 48 m.p.h.! Gathering speed again, we touched 67 before Blisworth—excellent, this—went over Roade at 62½, touched 72½ in descending to Castlethorpe, and once again eased down to about 55 m.p.h. between there and Wolverton. Getting well into speed again, we were doing over 60 m.p.h. through Bletchley, when yet again there came the easing, this time until we had got down to 48 m.p.h., after which we accelerated steadily on the rising grades until we topped the 1 in 330 to Tring at 57½ m.p.h.! Down from Tring we reached 64 m.p.h. at Berkhamsted, then eased slightly, and after that accelerated rapidly to a maximum of 76½ at King's Langley, after which we eased to 60 an hour through Watford. A final dash at 75 an hour through Wembley preceded the Willesden stop, which was made in 108 min. 20 sec., or ¾-min. under schedule. But it was an extraordinary run; and I am strongly inclined to think that the reason for several of the pronounced "easings" was that the driver endeavoured to bring his regulator too far back, so that the engine was working neither simple nor compound, but an inefficient mixture of both.

On the last up journey, with the presence of the Duke of York on the train as an incentive, No. 1157 made one of the most brilliant starts out of Birmingham, with such a load, that I have ever known, passing Stechford at 64½ m.p.h., Marston Green at 70, Hampton at 72½, Beechwood Tunnel at a minimum of 65, and Coventry 77½ an hour, immediately after which we both bettered "even time" and touched 80½ m.p.h. At Brandon we were still doing 75, and Rugby was passed after a slack to 35 m.p.h., in the fine time of 29¼ min. But then the engine, after witnessing once more to the capabilities it had previously shown on the 11.30 a.m. down, appeared to go to pieces. Entering Kilsby Tunnel at 51 m.p.h., we never exceeded 62½ m.p.h. at Weedon, and were then very badly checked before Blisworth. After that, 66 was the maximum down to Castlethorpe, promptly "eased" to 55 over the troughs; we fell to 48½ on the way up to Tring, and did nothing worth mention beyond, save for a final, and very brief, touch of 74 through Wembley. Thus, despite our magnificent exit from Birmingham, we lost 5¼ min. to Willesden, of which it is not possible to credit more than 3¾ min., at most, to the Blisworth checks, leaving at least 1½ min. to go against the engine. Such experiences defy explanation: but the work of the same engines on the Midland main line, as well as certain of the feats described in this article, forbid one to attribute such erratic behaviour to their design.

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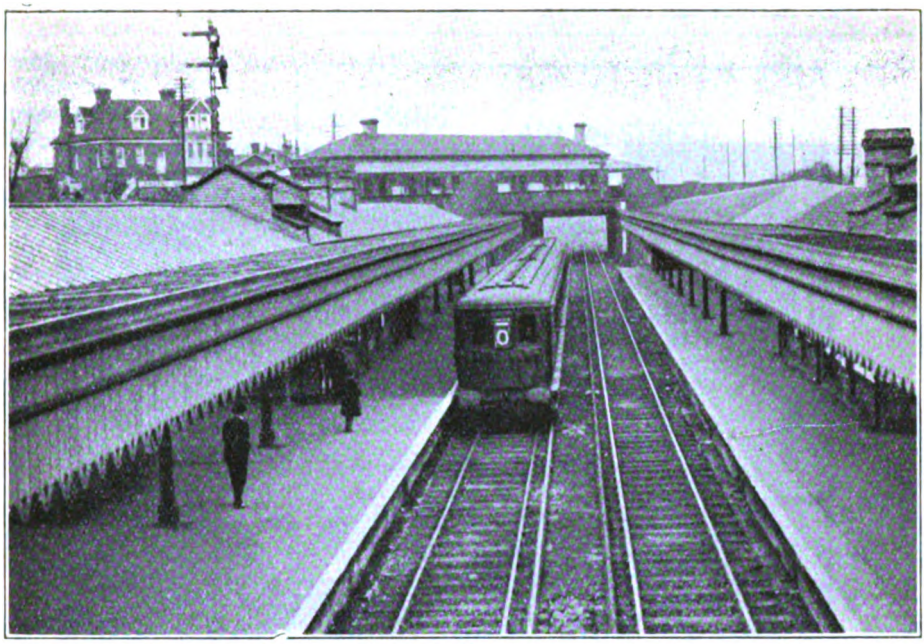

Photo.] ELECTRIC TRAIN AT GROVE PARK. [*Topical.*

Eastern Section Electrification, Stage II, Southern Railway.

IT will be remembered that electric trains have been working some of the routes forming Stage I of the Eastern Section electrification since July 12 last year. These routes all related to sections of the former London, Chatham & Dover system, except that from Bickley to Orpington use is made of the system of connecting lines between the "Chatham" and Tonbridge routes, equipped to enable Victoria or Holborn Viaduct electric trains to make Orpington their suburban terminus.

The stage now under notice forms part of the much more difficult work of equipping the complicated routes of the former South Eastern Railway, and applies to the routes from Charing Cross and Cannon Street to Orpington, via Chislehurst, including the branch from Grove Park to Bromley North via Hither Green, together with the Addiscombe line, the Elmers End-Hayes branch, and the New Beckenham-Beckenham Junction line via Lewisham Junction, and the "Ladywell loop" between St. John's and Ladywell.

We have already referred, on several occasions to the fact that, before the full value of electrification can be secured it has been found to be essential to re-lay the whole of the track connections on Cannon Street river bridge. The lay-out here was unavoidably of a very complex character, and although it served the purposes of traffic working years ago, it was entirely unsuited to the operation of an "intense" service of electric trains. It is true that, as mentioned in our pages at the time, the complex connections upon the bridge were found capable of utilisation in developing a scheme of parallel working during the hours of business pressure, which has, since February, 1922, done much to solve the problem of dealing with the heavy suburban traffic of this section. For the new conditions entailed by electrification, however, this lay-out was not regarded as a practicable one. Consequently, an entirely new track lay-out has been prepared, and is now in process of assembly in a field near New Cross Gate, ready to be transferred in

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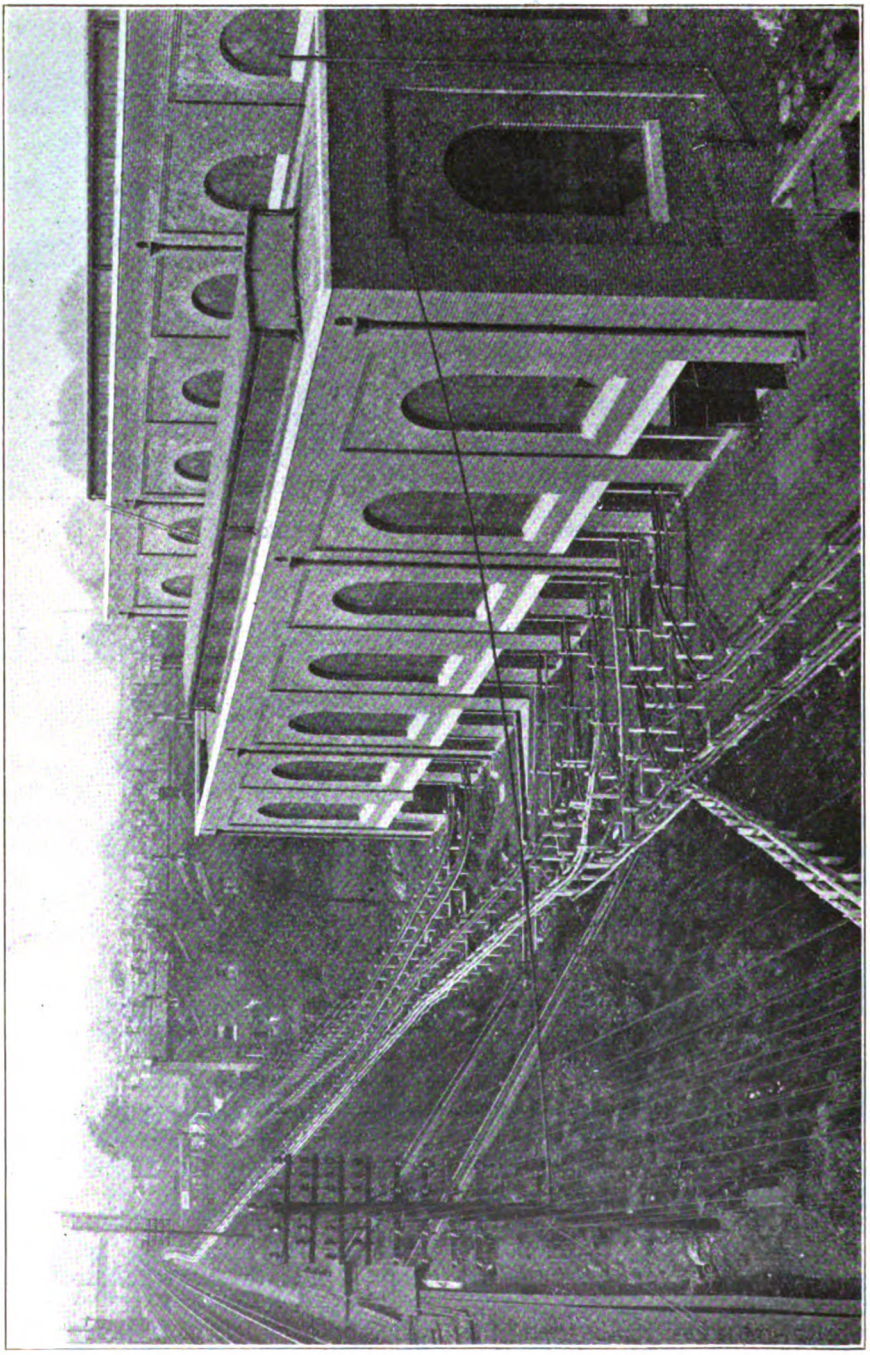

GENERAL VIEW OF LEWISHAM SUB-STATION, SHOWING ALSO OUTGOING FEEDER CABLES.

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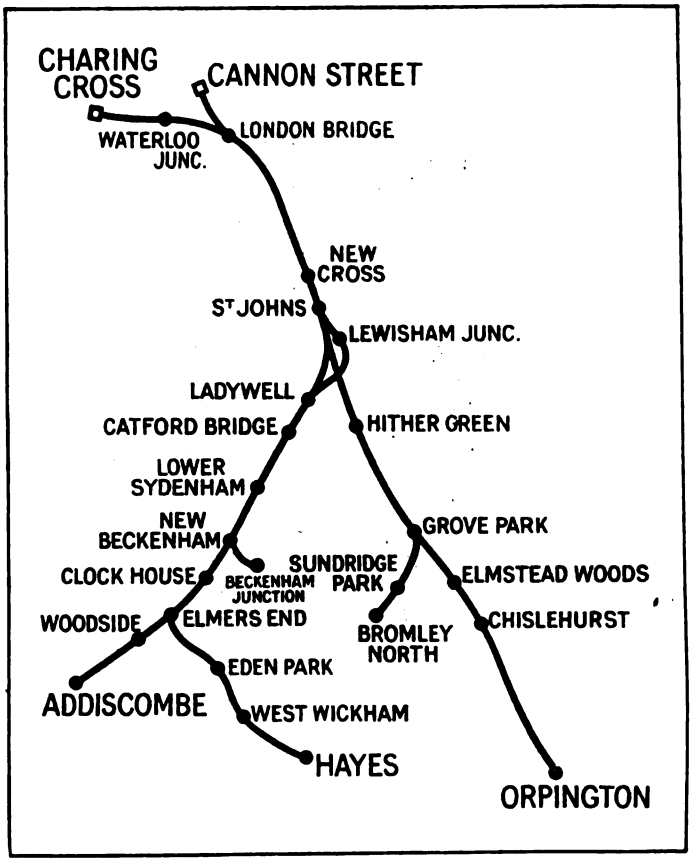
sections and placed in position on the bridge at Cannon Street.

Meanwhile, certain associated work has been put in hand, including the replacing and strengthening of some of the bridge girders ready for the new track lay-out, and it is contemplated that from the afternoon of Saturday, June 5, until 4 a.m on Monday, June 28 next, the bridge and station will be temporarily closed to enable the new track to be substituted for the old. Owing to the complexity of the undertaking this course is regarded as preferable to any attempt to make the change piecemeal while traffic is in progress. The view is held that the temporary inconvenience to passengers will be more than compensated for by the fact that from June 28, before the inauguration of the full summer train services, it will be possible to try-out thoroughly the new electric train services, test the new signalling, &c., and accustom the men to the new conditions.



MAP SHOWING ROUTES INCLUDED IN STAGE II OF SUBURBAN ELECTRIFICATION.

Meanwhile, four platforms, the present Nos. 5, 6, 7 and 8, at Cannon Street, and the necessary approach lines, have been equipped for electric traction, and from February 28 until June 5 these will suffice for the electric trains. Eventually there will be a fifth platform at Cannon Street adapted for electric working. Incidentally the platforms will be renumbered, No. 9 being No. 1, and so on reversely to the present system. For the time being the electric trains serving the Orpington, Bromley, Addiscombe, Beckenham Junction and Hayes routes will generally replace the existing steam services during the business hours, without essential modification, except for a degree of acceleration of journey times. During the quiet hours, however, and on Sundays, the services will be considerably augmented.

Mention must also be made of the fact that, some months ago, the tracks between Charing Cross and Metropolitan Junction were re-arranged to give, in order, down, up, down, up lines, instead of, as previously, up, down, down, up. The old arrangement was very suitable in days when many trains worked into and out of Cannon Street on their way from or to Charing Cross, but since all trains have been made to use either Cannon Street or Charing Cross, but not both, has proved inconvenient.

Including the altered Charing Cross-Metropolitan Junction section, and, when ready, the new lay-out on Cannon Street bridge, the Southern Railway will have a system of lines in this difficult area laid out so as to permit of convenient

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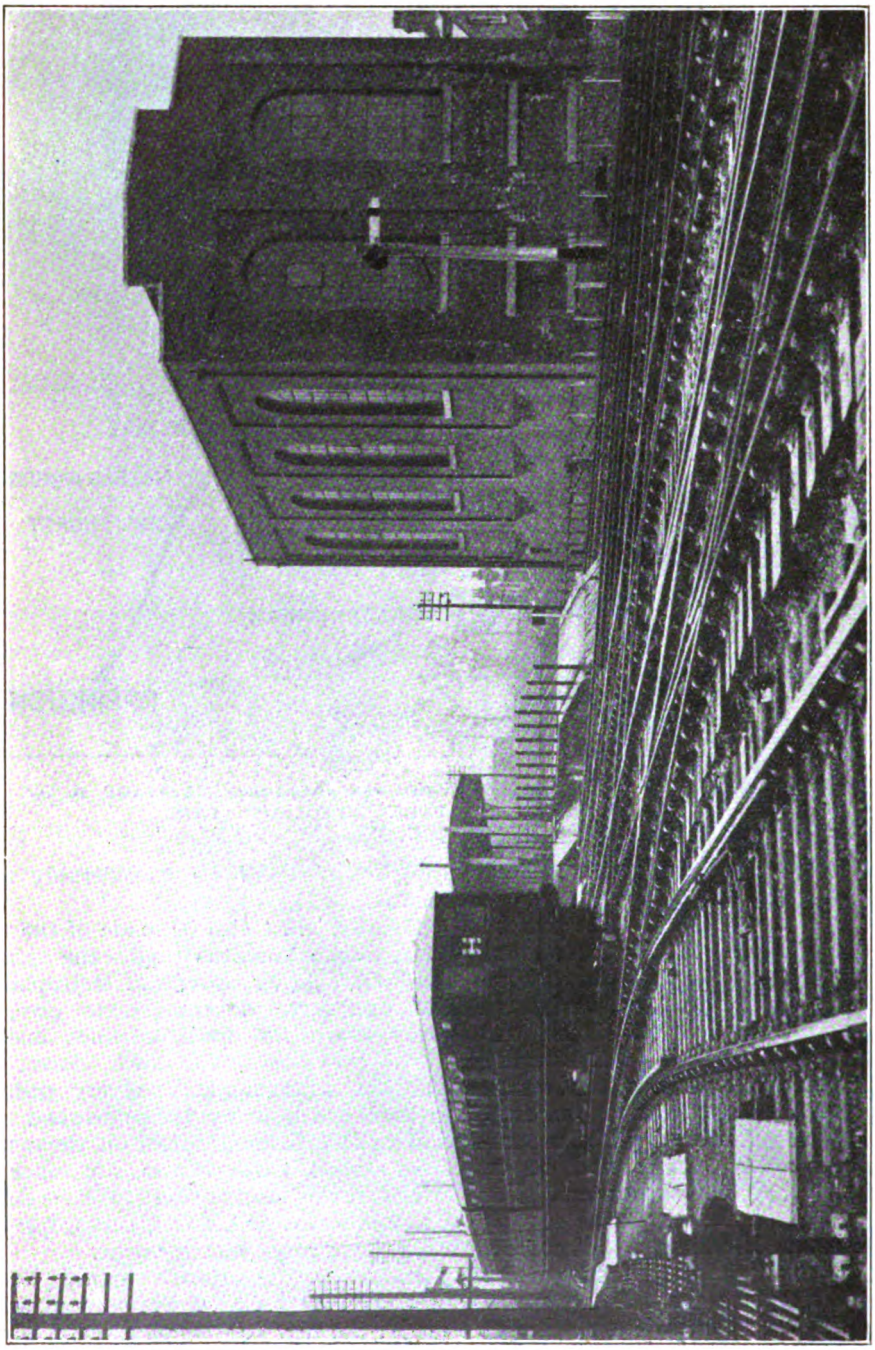

ELMERS END SUB-STATION, SHOWING HAYES BRANCH ELECTRIC TRAIN.

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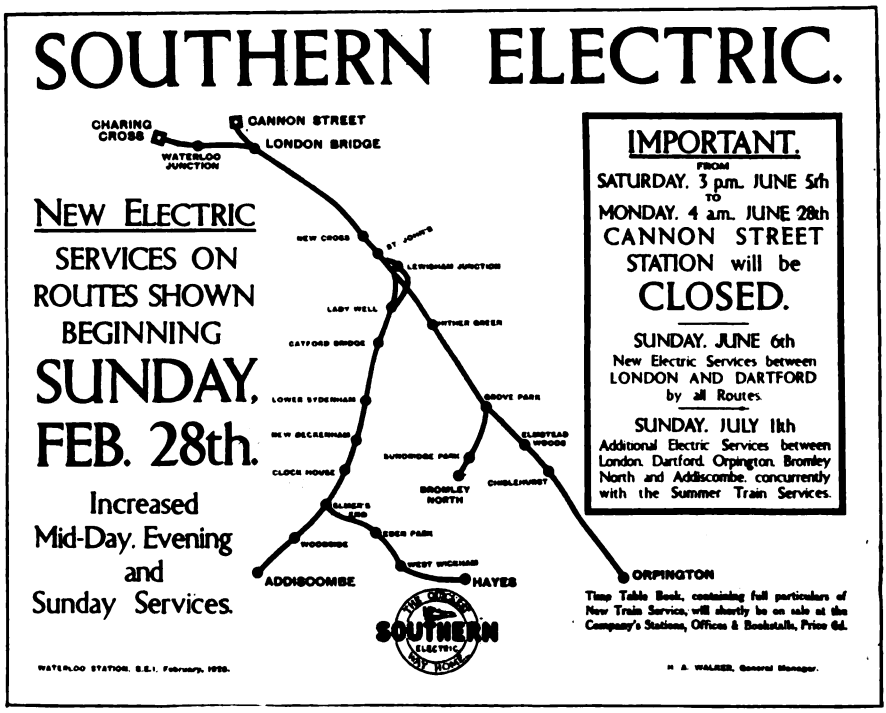
operation. At London Bridge there are three down platform lines and three up platform lines, together with a middle up road used by goods trains and empties, and useful if a train has to be held there to enable others to pass.

Beyond London Bridge station the lay-out continues to be very complicated though at the various junctions thence to North Kent East Junction several opportunities are provided for transferring trains from one track to another so as to avoid, as far as possible, fouling the paths of trains booked on a conflicting path at a given time. The selection of route was a special feature of the system of parallel working inaugurated in 1922, and in a revised form will be an important feature of the full service of electric trains for which provision will be made in July next.

From North Kent East Junction the arrangement becomes relatively simple, in that, after the divergence of the Greenwich line at the junction mentioned, and from a point nearing New Cross station, the lay-out consists of down and up North Kent and down and up main lines. Beyond St. John's station, a double-track line diverges, on the local or North Kent side to Lewisham Junction, one section continuing direct to Blackheath and to Dartford via Woolwich or Bexley Heath. These routes, are, however, concerned in the third state of electrification, while the curving lines from Lewisham Junction bend round to pass under the main lines and join the "Ladywell loop" line from Parks Bridge Junction, so that trains for Addiscombe, Beckenham Junction and the Hayes branch can be routed from the local lines via Lewisham Junction or via the main lines, Parks Bridge Junction and the "Ladywell loop" direct.



POSTER ANNOUNCING THE NEW SERVICES.

The main route continues with down and up local and down and up main tracks through to Orpington, the limit of electric working. The Bromley North branch diverges on the main line side, but crossings enable through trains for the branch to be run over either local or main lines, while a side platform is also available on the up main line side.

The Addiscombe branch is ordinary

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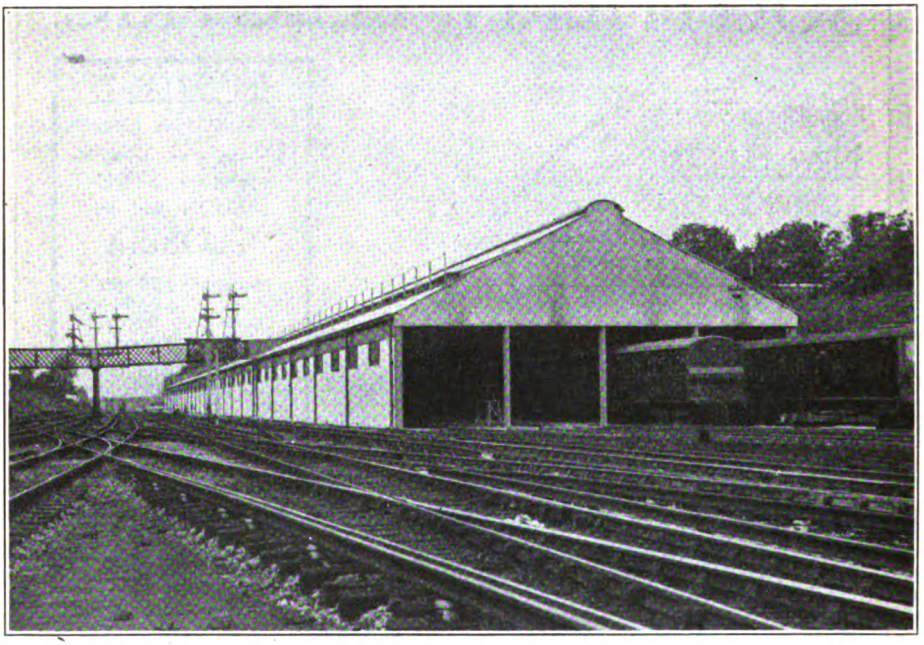
two-track throughout its length, though the terminus has three platforms. At Elmers End, the junction for the Hayes branch, there are bay platforms on either side, the usual arrangement being that an up connecting branch train runs into the bay platform on the up side before the arrival of a train from Addiscombe and then crosses over to the down side bay to make connection with a down train. There are, however, through connections to the branch, in view of the fact that at the hours of business travel several through trains are operated.

To provide for electric working, except that temporarily four and later five platforms and their approach lines at Cannon Street only will be equipped, all running lines within suburban limits on the routes concerned can be used by electric trains, so that it will still be practicable to operate trains for specific destinations over any suitable track, main or local, to suit operating convenience.

The conductor rails, supplied by Dorman Long and Co. Ltd., consist of either 100 lb. or 150 lb. F.B. section rail, according to location, the running rails being used for return, except that on part of the Hayes branch and at one or two other places a fourth rail is laid between the running rails to ensure that there is sufficient return capacity. This fourth rail, where used, does not have any direct connection with trains, in that its purpose is served by bonding with the running rails, the return capacity of which it is designed to amplify. The rail bonds have been supplied by British Insulated and Helsby Cables Limited, while the conductor rail insulators were manufactured by Bullers Limited.

As previously explained, current is not generated by the company but is purchased from the London Electric Supply Corporation. Current is received at Lewisham, where the sub-station is in two sections, one concerned with current receipt and metering and distribution to other sub-stations, and the other constituting a sub-station for sections served directly therefrom. It will be remembered that it had been intended that the routes upon which electric traction is to be inaugurated on February 28 were scheduled for electric working during December last, and, as the Southern Railway Company explained in an official statement issued some time ago, the



EXTERIOR OF ORPINGTON ELECTRIC CAR SHEDS.

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delay was due to difficulties in regard to the supply of current, the responsibility for the delay, resting with the London Electric Supply Corporation.

Lewisham sub-station distributes to the local sub-stations for the whole of the electric system. Those at Victoria, Holborn Viaduct, Loughborough, Upper Sydenham, Shortlands, Chislehurst, Nunhead and Catford have been in use since electric working was commenced on the routes which have been electrically operated since July 12 last.

The new routes also receive current through the Chislehurst and Catford Bridge sub-stations already in use for other routes. Both of these sub-stations contain plant supplied by the British Thomson-Houston Co. Ltd. These two sub-stations are located at points where the newly-equipped routes are associated with or closely adjacent to routes which have been in use for electric trains since last July.

The sub-stations solely concerned with stage II, in addition to Lewisham, are Cannon Street, Grove Park and Elmers End. Those at Charlton, Plumstead, Belvedere, Shooter's Hill, Barnehurst, Eltham, Sidcup and Dartford will supply stage III. The distribution diagram given in our issue of September 18, 1925, is repeated. There is no need, however, to give again the detailed particulars of the equipment of sub-stations, in that the principal features of the installation at Lewisham were then fully described, as also typical sub-stations associated with stage I.

The equipment at Lewisham has been principally supplied by the Metropolitan-Vickers Electrical Co. Ltd., and the English Electric Co. Ltd. Of the sub-stations now brought into use that at Elmers End has British Thomson-Houston equipment, while those at Cannon Street and Grove Park include English Electric plant. The high-tension feeder cables have been supplied by Johnson and Phillips Limited, while the low-tension cables have been supplied by the Macintosh Cable Co. Ltd., their special dielectric "Maconite" insulation being utilised at places calling for special insulation.

For some time prior to February 28 trial trains were worked over various routes, partly for testing the equipment and partly for the purpose of training motormen. These were not, however,

INTERIOR OF ORPINGTON ELECTRIC CAR SHEDS.

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SOUTHERN ELECTRIC

NEW SERVICES

On and from February 28th, 1926

ROUTE INDICATORS.

DOWN. SERVICE AND ROUTE.	HEAD INDICATOR.	UP. SERVICE AND ROUTE.	HEAD INDICATOR.
CHARING CROSS or CANNON STREET to BROMLEY NORTH	Ō	BROMLEY NORTH to CHARING CROSS	Ō
		BROMLEY NORTH to CANNON STREET	Ȯ
CHARING CROSS or CANNON STREET to ORPINGTON	O	ORPINGTON to CHARING CROSS	Ȯ
		ORPINGTON to CANNON STREET	O
CHARING CROSS or CANNON STREET to BECKENHAM JUNCTION— via LEWISHAM	I	BECKENHAM JUNCTION to CHARING CROSS via LEWISHAM	T
		BECKENHAM JUNCTION to CHARING CROSS via LADY WELL	T̈
via LADY WELL	T	BECKENHAM JUNCTION to CANNON STREET via LEWISHAM	I
		BECKENHAM JUNCTION to CANNON STREET via LADY WELL	İ
CHARING CROSS or CANNON STREET to HAYES— via LEWISHAM	H	HAYES to CHARING CROSS via LEWISHAM	H̄
		HAYES to CHARING CROSS via LADY WELL	Ḧ
via LADY WELL	H̄	HAYES to CANNON STREET via LEWISHAM	H
		HAYES to CANNON STREET via LADY WELL	Ḣ
CHARING CROSS or CANNON STREET to ADDISCOMBE— via LEWISHAM	T	ADDISCOMBE to CHARING CROSS via LEWISHAM	T̄
		ADDISCOMBE to CHARING CROSS via LADY WELL	T
via LADY WELL	T̄	ADDISCOMBE to CANNON STREET via LEWISHAM	T
		ADDISCOMBE to CANNON STREET via LADY WELL	Ṭ

WATERLOO STATION S.E.1.

THE QUICKEST WAY HOME. SOUTHERN ELECTRIC

H. A. WALKER, General Manager.

POSTER ANNOUNCING HEAD CODES FOR NEW ELECTRIC SERVICES.

utilised for conveying passengers, except that the Hayes branch was, for some months, worked by a three-coach unit train instead of the usual branch steam set, though the through trains to and from Cannon Street continued to be worked by steam until electric operation was definitely inaugurated.

Electric trains are made up on the same principle as that already in force on other sections, that is, with two three-coach unit sets, with or without a two-coach trailer unit placed between at busy periods, reduced to one three-coach unit during the slack period. The motor coaches have been constructed by the Metropolitan Carriage, Wagon & Finance Co. Ltd., and the trailer coaches supplied by the Birmingham Railway Carriage & Wagon Co. Ltd. A number of vehicles were also reconstructed at Ashford Works and electrically equipped at Brighton.

All trains have the Westinghouse Brake & Saxby Signal Company's brake equipment. The traction motors were supplied by the English Electric Co. Ltd., while the Metropolitan-Vickers Electrical Co. Ltd. has supplied electrical control apparatus for both motor and trailer units, also train heating and lighting.

In connection with the electrification, extensive car cleaning and inspection sheds have been in use at Orpington for some time past, also the carriage-cleaning sheds at Addiscombe.

At Bromley North a new station is now nearly completed, in place of the somewhat antiquated erection which hitherto did duty. By the time the whole of the routes concerned in stage III are available, light signalling will have been installed between London Bridge and Charing Cross and Cannon Street, as previously described.

It may be pointed out that these routes described, totalling 88 track-miles, have been electrified at a cost of £1,300,000, while 20 eight-coach trains have been built for the services, comprising 160 vehicles (apart from spare trains). The new services give 50 to 100 per cent. improved schedules on Sundays, midday on weekdays, and in the evenings after the rush hours, and will result in an increased

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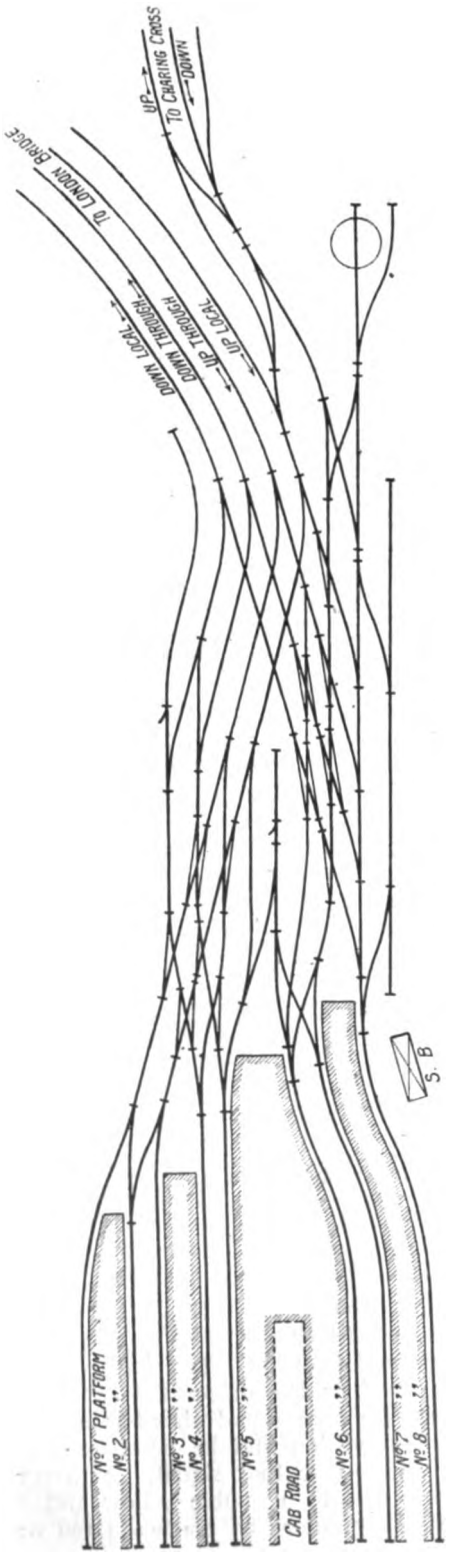

NEW PLATFORM NUMBERING AND TRACK LAY-OUT, CANNON STREET STATION AND BRIDGE.

train-mileage of no less than 8,132 miles a week.

A feature of the new services is that the half-fare return tickets to London from nearly all Southern Railway suburban stations, between 10.30 a.m. and 4.30 p.m., will remain in force, but will have the additional attraction of being available by over 50 per cent. more trains.

Apart from the full hour services the following are the characteristics of the new facilities :—

WEEKDAYS (Mondays to Fridays inclusive).

Orpington.—One electric train per hour, which, with the existing steam trains, will approximate to a half-hourly service.

Bromley North.—Two trains per hour.

Mid-Kent Line.—Four trains per hour—two to Beckenham, two to Addiscombe, with a shuttle service between Elmers End and Hayes.

SUNDAYS.

Orpington.—Hourly service.

Bromley North.—Half-hourly service.

Mid-Kent Line.—Half-hourly service to Addiscombe with a shuttle service between Elmers End and Hayes.

We are indebted to Sir Herbert Walker, K.C.B., General Manager; Mr. E. C. Cox, C.B.E., Chief Operating Superintendent; Mr. A. W. Szlumper, C.B.E., Chief Engineer; Mr. R. E. L. Maunsell, C.B.E., Chief Mechanical Engineer; Mr. Herbert Jones, Electrical Engineer; and Mr. A. Raworth, Electrical Engineer (New Works) for co-operation in regard to the preparation of this article; also to the firms mentioned above in respect of the work for which they have been responsible.

In connection with the electrification, an entirely new system of colour light signals is being installed to the Holborn Viaduct, Elephant and Castle, and Charing Cross, Cannon Street, and London Bridge area, prior to extension beyond. This has been developed by Mr. W. J. Thorrowgood, Engineer and Telegraph Superintendent, S.R., on the basis of a scheme evolved by the Institute of Railway Signal Engineers. The special point is that four indications are used (1) red-stop; (2) single yellow—caution (practically a repeater in that it shows that the next signal is at "stop"); (3) double yellow—warning (to some extent a "distant" as it indicates that next signal is at "caution" and the one beyond at "stop" so that full braking distance is still available); (4) green—clear.

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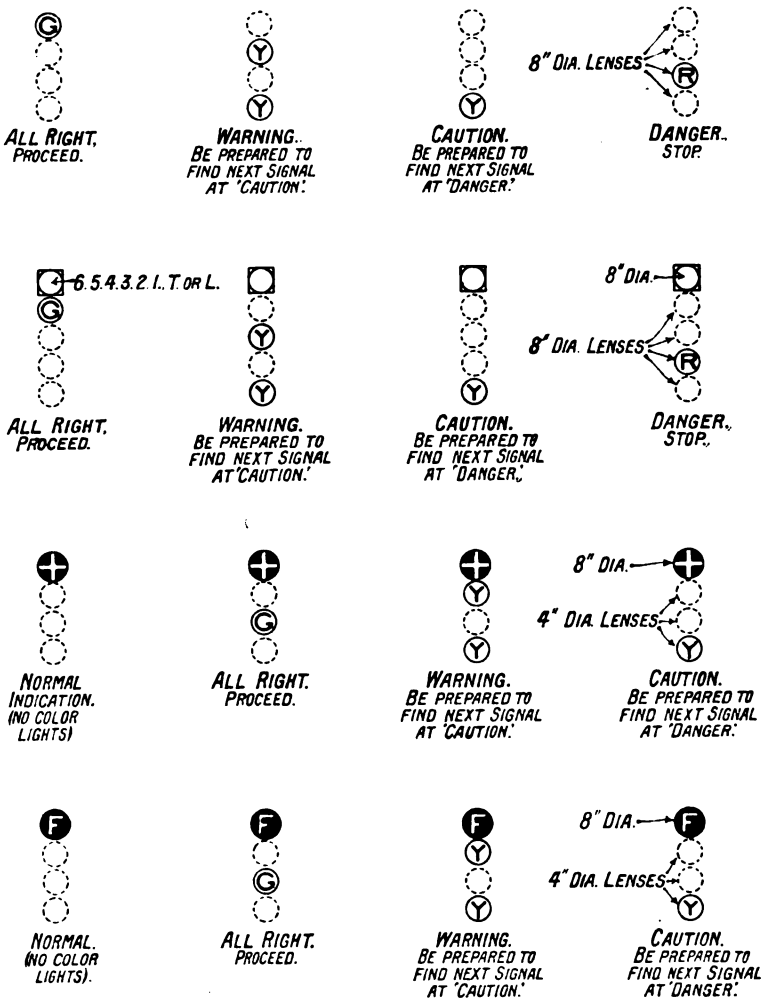

Ordinary Four-Aspect Signals.
Four-Aspect Signals with Route Indicators.
Auxiliary Signals.
Auxiliary Signals for Foggy Weather.

REPRESENTATIVE APPLICATIONS OF COLOUR LIGHT SIGNALS.

A green aspect tells a driver going at any speed, say 70 m.p.h., that he has a clear road and that the next signal ahead at that moment is either a double yellow or a green. A driver passing a double yellow aspect receives a warning that he has full braking distance, and that the next signal ahead is at that moment in the "caution" condition, *i.e.*, exhibiting a single yellow aspect. Under such conditions the driver will take steps to get his train under control. The single yellow aspect cautions the driver that at that moment the next signal ahead is in the "stop" condition and he must be prepared to stop at that signal. A driver always comes to a double yellow and a single yellow before he reaches a red or

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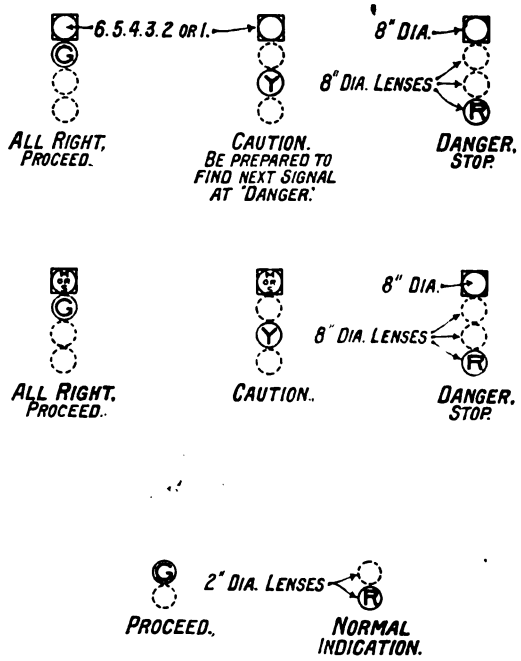
"stop" aspect. He may, of course, pass several double yellow or single yellow aspects in succession, but in any case, before he arrives at an aspect exhibiting red or "stop," he will have passed a double yellow and a single yellow aspect.

At junctions one four-aspect colour light signal and a route indicator are employed, as being simple and avoiding the exhibition of a number of lights. A slow speed diverging junctions, such as the starting signal from a platform, or for a home signal for entering a station, where there are two or more diverging routes, one four-aspect colour light signal and a route indicator are used. In the cases of diverging junctions where trains run at speed, a four-aspect signal will be provided for each route.



Three-Aspect Signals with Route Indicators. Intermediate Platform Signals at Terminals. Shunting Signals.

THREE-ASPECT AND SHUNTING SIGNALS.

It has often in the past been necessary, owing to the curvature of the line or other reasons, to provide repeaters for the signals the driver may be approaching, and which he cannot see in time to act upon. If the signal is "on" the repeater, as a matter of course, shows "on" also, and the driver has to pass it, although it indicates "stop" and shows a red light.

The four-aspect colour light system has been designed so that a red light for the road ahead on all occasions shall be an absolute "stop" signal. In order to comply with that stipulation a repeater of a signal ahead cannot be used. This difficulty has been overcome by providing an auxiliary signal instead of a repeater in such cases. It has been arranged that the auxiliary signal shall show three aspects —green, double yellow and single yellow— and have a white light (St. George's Cross) brilliantly illuminated on a black background immediately above the colour light aspects. Normally the auxiliary signal would show the white cross only to avoid any risk of the aspect, if it were provided, conflicting with the signal behind.

It is hoped that fog repeaters of the signal ahead will not be required, but in case they are wanted it has been arranged to use a three-aspect colour auxiliary signal with the letter "F" brilliantly illuminated on a black background instead of the St. George's Cross. These, if used, will be controlled by the signalman from the signal-box. Shunt signals will have lenses 2 in. in diameter and be two-aspect light signals, either red or green. The green will probably be a brilliantly illuminated green "S" on a black background. The letter "S" would be $1\frac{3}{4}$ in. on a 2-in. lens.

Generally, the aspects are arranged in a vertical line, but in many places there is not sufficient head room to allow of this, and in such cases the four-aspect lights have been arranged in the form of a cross in a cluster, the green being on the left-hand side, the red on the right and nearest to the driver, and one yellow on the top and the other at the bottom, so that the two yellows appear in the same vertical line and separated sufficiently to prevent

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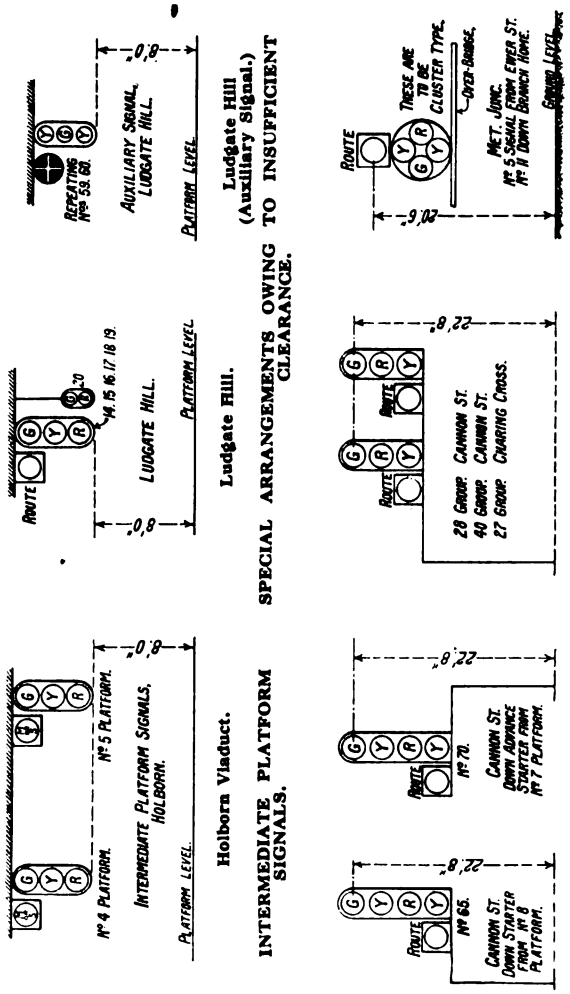

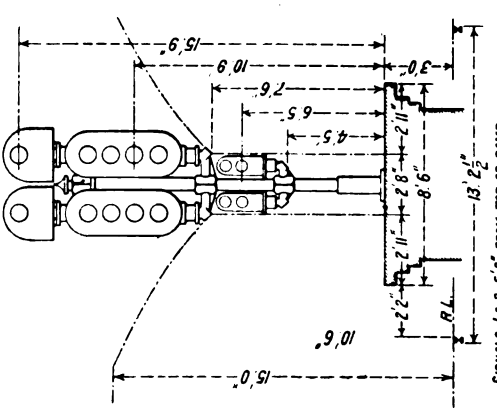

CANNON STREET STARTING SIGNALS, Nos. 1-2 AND 3-4.

them combining or running into each other at a distance. Thus the general form of the aspects is maintained as far as the driver is concerned. In some cases where signals have had to be placed under station roofs, there has not been sufficient headway to allow of the route indicator and coloured aspects to be in a vertical line. In those cases it has been arranged to place the route indicator, of St. George's Cross, on the left-hand side of the coloured aspects.

Owing to the fact that the light given out from the front of the lens of the colour light signal lamps is in the form of a beam, it can only be seen while the driver is in a straight line, or very nearly so, with the front of the lens. Consequently, if the lamp is fixed high up the post, when he arrives within about 15 ft. to 40 ft. he cannot see the beam; in fact, he is below the beam. With these signals it is arranged that the lamps shall be as near to the driver's line of sight as possible—11 ft. 6 in. above rail level is the height aimed at. The lamps have perforce to be placed at least 4 ft. 6 in. to the left from the running rail, so that even then, when he comes up to the signal post, he is out of the main beam of light and could not see it. To overcome this, a side light has to be provided.

At junctions the signal aspects for the straight-running lines present no difficulty as the aspects are in one vertical line, but at diverging junctions two separate sets of light signals are placed side by side vertically. The aspects for

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the straight road are similarly arranged to those on a single straight road, but when the route is set for the diverging line, such as in the case of a crossover from, say, the up main through to up main local line, it is arranged that the driver shall pass a single yellow aspect in the signal next before the junction signal, and that the junction signal shall remain at "on" or red, irrespective of the state of the road ahead, until the driver has passed the single yellow aspect. It is thought that although the driver should receive a "caution" signal on approaching the junction and pass a single yellow aspect, a green or double yellow or single yellow aspect should not be exhibited in the junction signal at the same time. It is undesirable that a driver should be given a single yellow aspect as a "caution," on account of the location he is approaching, and at the same time see a green, single or double yellow, showing the road ahead of the junction is "clear." It would not be in conformity with the sequence adopted with the four-aspect colour signal scheme. This modification should not, provided the junctions are not numerous, delay traffic unduly, but at terminal stations and other similar places it is considered that the speed of trains is slow and the principle of this modification is not applied within the station limits.

The question as to what should be done as regards signals at the junction of the existing semaphore arm and the new four-aspect light signal system, *i.e.*, where shall one begin and the other finish, has been solved by arranging that the starting signal at Elephant and Castle, where the semaphore system ends, shall be of the semaphore arm pattern, but the equivalent of the distant signal for Blackfriars signal box shall be a two-aspect light signal with a green and a yellow aspect, so that if the Elephant and Castle starting signal is "off" and Blackfriars distant is "on," a yellow light will be exhibited, but if the Elephant and Castle signal and the Blackfriars distant signals are both "off," a green light will be given for the latter.

The route indicating signals consist of a clear lens with movable discs and the figures or the letters stencilled out of the disc, so that the light passes through the stencilled places only, and the letters or figures appear brilliantly on the surface of the lens. This figure can be distinctly seen and read by the drivers at from 150 to 200 yards away in bright sunlight with an electric incandescent lamp of 20 to 25 c.p. in the focus, but at night-time, when it is dark, the letter, or figure, would appear extraordinarily brilliant and, from peculiar characteristics of the lens and the source of light, the letters or figures may run into one another, so that the definition is bad. It may at a distance even look like an ordinary brilliant light, without any shaped figure being seen. To overcome this the voltage of the electric incandescent lamps is reduced from 12 to 8 volts, resulting in the candle power of the lamps being lowered, but, being night-time, the brilliancy of the letters or figures remains quite bright enough to be seen during the dark hours with equal ease as in the daytime.

In an ordinary light signal lamp a source of light is placed at the principal focus of the lens, and a single beam of light passes out of the lens in a straight parallel beam. The distance between the principal focus and the principal point of the lens is the focal length of the lens. Now, if a second source of light is placed on the right-hand side of the first source of light, at, say, an angle of 45 degs., so arranged as to be the focal length from the principal point of the lens, and that the angle between the lines from the first source and the second source of light and the principal point shall be, say, 45 degs., then a second and distant beam of light will pass from the second source of light through the principal point of the lens and emerge from the front of the lens as a parallel beam on the right-hand side of the main beam and in a direction making an angle of 45 degs. with it. Similarly, if a third source of light is placed on the right-hand side of the first source, a beam of light will pass from the third source through the principal point of the lens at an angle of 45 degs. from the main beam but on the left-hand side of it. Thus, there are three beams of brilliant light given out from the same lens, all at the same time.

Such a three-beam lamp has been tried in tunnels full of black smoke, and in all conditions, found in long tunnels, and the light given out by it has been distinctly

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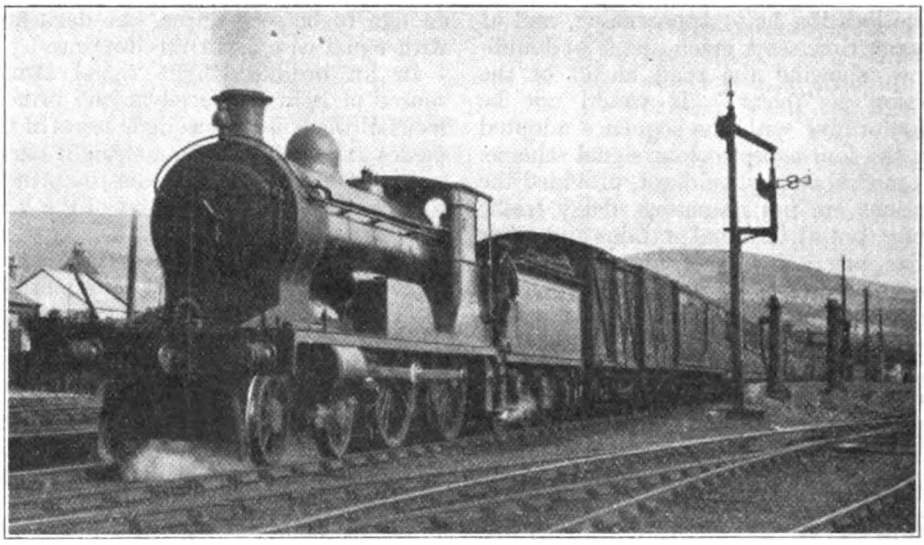
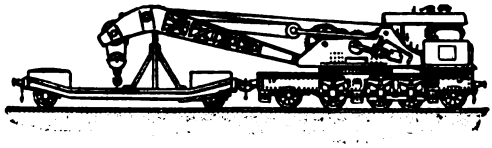
seen by the driver, where an ordinary white, or green, or yellow, or red signal aspect is exhibited, at least from 30 to 40 yards away. In the case of a red three-beam light aspect the black smoke around the signal is illuminated brightly so that, in addition to the red light aspect, the smoky atmosphere is distinctly coloured, and assists the drivers to locate the signal. Similarly with yellow and green aspects.

The principle involved in the three-beam lamp is applied to provide the side light for the light signal aspect as mentioned before. It can be arranged by placing the second lamp on any particular point on the spherical focus so that the beam of the side light will emerge from the lens in any direction required, and give the driver a good view, of it either to the right, or left, or above, or on a level, or lower than the main beam. This side-light is being used in all the four-aspect signals at Holborn, Charing Cross and Cannon Street.

REBUILT 4-4-0 LOCOMOTIVE, HIGHLAND SECTION, L.M.S.R.



We are indebted to Mr. R. D. Stephen, of Inverkeithing, Fife, for the photograph reproduced showing a Highland section train leaving Dingwall Junction, hauled by a rebuilt 4-4-0 of the "Loch" class. It will be noted that the engine has been fitted with a boiler of Caledonian type, the chimney being similar to those fitted to Mr. Pickersgill's 4-4-0's on that line. The cab is, however, unaltered. The fireman is standing on the footplate ready to give up the tablet when passing the signal cabin.



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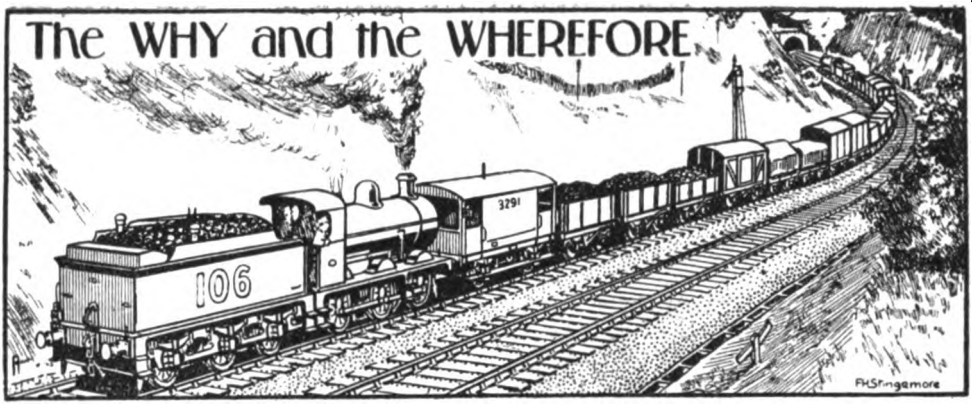

RAILWAY MAGAZINE *readers desiring information should mark envelopes " Query " in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning " British Locomotive Practice and Performance " may be addressed to Mr. Cecil J. Allen, c/o* RAILWAY MAGAZINE, 33, *Tothill Street, Westminster, London, S.W.*1. *No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or " grouping," the pages of the " Railway Year Book "* (5s. *net*) *should be consulted. The twenty-eighth Annual Edition* (1925) *of this standard railway reference work is now published. All previous Editions are out of print.*

The Van Railway.

This single line, 6¾ miles long, was constructed by virtue of a certificate granted by the Board of Trade in 1873 under the Railway Construction Facilities Act, 1864. The purpose in view was to connect the Van Lead Mines with the Cambrian Railways at Caersws. Mineral traffic commenced in August, 1871, the company possessing two locomotives. From December, 1873, passengers were conveyed in " mixed " trains, a composite second and third-class coach being provided for the purpose. In 1876 a second carriage was provided, and although the receipts from second-class passengers remained as previously at £1 per annum, and from £70 to £80 per annum from third-class, in this year season tickets were introduced and produced £283. By 1879 the mines were not producing much lead, and in that year there was no season ticket traffic, whilst the receipts from third-class passengers fell to £31. The line, therefore, was closed for passenger traffic. The mineral traffic continued till 1892, when, as a result of a deficit on working, the line was closed. In 1896 the Cambrian Railways acquired the Van Railway, and a train was run three times a week in each direction over the line.

[Reply to " KYBALD TWYCHEN."]

2-6-4 Tank Engines.

The fact that the S.R. 2-6-4 tank engines have been designed by Mr. R. E. L. Maunsell, and the Metropolitan 2-6-4 tank engines utilise material for engines also designed originally by Mr. Maunsell, necessarily entails a degree of similarity in certain respects. The S.R. 2-6-4 engines are, however, of entirely new construction. The new L.N.E.R. 0-6-2 tank engines represent a standard class of tank engine for suburban working on all sections, which, no doubt, explains their appearance on the Great Central section as well as elsewhere on the L.N.E.R. system. As they are smaller engines than the G.C. 4-6-2 tanks, they can hardly be expected to equal the performances of the latter, though they are, presumably, well adapted to meet requirements. On the Great Eastern section, corresponding engines have shown quite good speed capabilities, notwithstanding the smallness of their coupled wheels.

[Reply to " METROLANDER."]

Wivelsfield Disaster L.B.S.C.R.

The Wivelsfield disaster occurred on Christmas Eve, 1899, and resulted in six deaths, while 20 other persons were injured. During a dense fog, an up Pullman car express from Brighton, hauled by 4-4-0 locomotive No. 206, ran at

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considerable speed into the rear of an up boat express from Newhaven, which had been stopped at Wivelsfield, near Keymer Junction, for signals and had just started to move on again. The Brighton train had left Brighton seven minutes behind time, delay being due to pressure of Christmas traffic and the fog; and the boat train, which, in the ordinary course, would have followed the Brighton train, was on this occasion given precedence of it. The cause of the collision was found to be primarily the adverse conditions of the weather, delaying the Brighton train, with the consequent precedence of the boat train from Keymer Junction, and this also was certainly the cause of the driver of the Pullman train missing the signals at which he should have reduced speed and come to a stand.

[Reply to C. HAMILTON ELLIS.]

Waterford and Tramore Railway.

This line, now included in the Great Southern Railways of Ireland, previously connected with the Great Southern and Western Railway and with the Dublin and South Eastern Railway at Waterford, running thence to Tramore. Obviously, there is no justification, therefore, for referring to it as an isolated system. Probably the reference you mention included the use of the word "isolated" in the sense that the railway was an independent one and not part of a larger system, as it has now become. Most of the small railways in Ireland have been described in the pages of THE RAILWAY MAGAZINE at one time or another, though mostly in issues long since out of print. Brief particulars are, however, given of most of them in *The Railway Year Book.*

[Reply to R. I. N.]

The "Innocent" Railway.

This line was referred to in Volume IV (1889) of THE RAILWAY MAGAZINE, in an article dealing with the jubilee of the first section of the "Waverley" route. Several other allusions have appeared from time to time. The volume above mentioned also included a reference to the Peebles and West Linton line. Except for the January, 1926, number, no issues including reference to either of these lines are now in print. You may, however, be able to consult a file of back volumes in a public library.

[Reply to B. PATTERSON.]

High Speed at Newark.

In view of the somewhat sensational claim made by you for extremely high speed in the case of an express passing through Newark on the L.N.E.R. main line on the date mentioned, we are advised by the L.N.E.R. that the train in question was travelling at a speed of approximately 55 m.p.h. at the place referred to. We cannot, therefore, understand how you can have obtained the impression that the speed was something approaching 100 m.p.h.

[Reply to W.C.W.]

Southern Railway Locomotives.

The engines described as 4-2-2 in the Southern Railway official report are, as you surmise, the "Drummond" uncoupled 4-2-2-0 engines of the "720" class. There are six of these engines still in service. The 4-4-0 engines and 2-4-2 tank engines have, presumably, come into stock through one of the smaller companies absorbed. There was certainly one 4-4-0 tank engine in the Isle of Wight, though we cannot call to mind a 2-4-2 engine.

[Reply to A. H. HASTIE.]

Class Colours for Railway Coaches.

In early days several railways, including the Great Western and Lancashire and Yorkshire, together with the Metropolitan up to a comparatively late period under steam traction, adopted distinctive colours for the respective classes. We have, however, no details so far as the Lancashire and Yorkshire Railway is concerned. Your suggestion as to stations to be described in our "Notable Railway Station" series will be borne in mind.

[Reply to F. INGHAM.]

Railway Gauges.

The gauge of the Spanish railways is 5 ft. 6 in. Seeing that the French gauge is the usual standard, obviously trains cannot work through between France and Spain, and a change of trains is entailed at the frontier stations. The City and South London Railway has always been laid to the usual standard gauge. Its

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recent reconstruction was for the purpose of enlarging the tunnels to take larger rolling-stock.

[Reply to F. G. EATON.]

P.L.M. Locomotives.

We have had no information officially, neither have any of our readers who have travelled in France sent in any particulars, as to the work of the P.L.M. or Est 4-8-2 locomotives on express service. So far as we are aware, each of these companies has one engine only of this particular class in service at present.

[Reply to "SWISS OBSERVER."]

Railway Mileage in Large Cities.

In view of the difficulty of selecting a suitable area basis to describe London, New York, and other large cities as "greater," we do not see how any useful comparison can be made as to the respective railway mileages. In any case, we have no data upon which comparisons such as those you ask for can be made.

[Reply to V. W. O.]

New S.R. Locomotives.

Obviously, we cannot speak as to the intentions of the railway company in regard to whether new locomotives under construction will be confined to one section or utilised also on others. Your enquiry *re* G.W.R. locomotive No. 3282 was answered last month in reply to another correspondent.

[Reply to P. MURRAY.]

New 4-4-0 Locomotives, S.R.

You are correct in pointing out that we have not given the names of the new 4-4-0 locomotives under construction, though we have mentioned the fact that they were to be named. Our statement that a list had been published was due to confusion with another enquiry.

[Reply to H. A. POPER AND OTHERS.]

L.M.S. Locomotives in South Wales.

We have no exact particulars, but assume that the engines concerned are usually 4-4-0, 2-4-0, 0-8-0 and 0-6-0, with some of the 0-6-2, 4-6-2, and other classes of tank engines.

[Reply to "SCORPION."]

Pre-Grouping Liveries.

Seeing that, in the course of years, locomotives of practically every railway have been illustrated by colour plates in the pages of THE RAILWAY MAGAZINE, we do not see that any good purpose would be served by a collection of illustrations such as you suggest.

[Reply to G. GREENHILL.]

L.N.E.R. Locomotives.

2-6-0 No. 4656 is a Great Northern mixed-traffic locomotive, though we were not aware that this class is now used on the route between Yarmouth and Cambridge. We do not recognise any 2-4-0 locomotive numbered 240 belonging to the G.E. section.

[Reply to T. H. BEECH.]

The Chard Branch, S.R.

By a working arrangement, the G.W. trains working to Chard over that company's branch are extended to Chard Junction to connect with S.R. trains. This is a matter of agreement between the companies merely for convenience, and can be determined at any time.

[Reply to R. S. JOHN.]

G.N.R. 8 ft. "Single" No. 1.

So far as we know, this engine has now been returned to King's Cross shed, where it has been preserved since it was withdrawn from service.

[Reply to R. G.]

Cork, Bandon and South Coast Railway.

As given in pre-grouping volumes of *The Railway Year Book*, engines on this line were painted olive green and lined in yellow.

[Reply to R. I. N.]

"Castle" Class Locomotives, G.W.R.

Names of these engines were given in "Locomotive Matters" in the issues for September and October, 1925.

[Reply to S. CANE.]

Picking up Water.

You are correct in stating that the manipulation of the water-scoop on a locomotive is, normally, the fireman's duty.

[Reply to H.C.L.]

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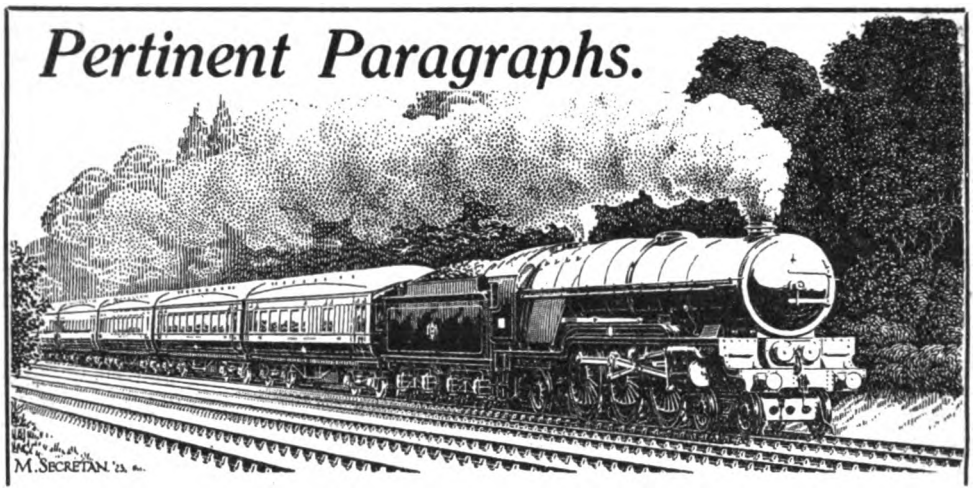
Pertinent Paragraphs.



London Midland & Scottish Railway Meeting.

SIR GUY GRANET had many interesting and reassuring things to say to the shareholders of the London Midland and Scottish Railway at the annual meeting on February 26, but the optimistic note was not pitched unduly high. The passenger traffic of the past year was on the whole satisfactory, and the position regarding merchandise traffic was healthy in spite of the fall in tonnage, because of the substantial saving in the cost of collection and delivery, the longer average haul, and the expansion of the lighter and higher-rated traffic at the expense of the heavy and low-rated traffic. Coal was the weak spot in 1925, but that now shows signs of improvement. In expenditure there was the very gratifying reduction of £696,000 in the operating expenses (locomotive running and traffic), of which £187,000 represented what the Chairman called true economy, resulting from improved organisation, and this would have been greater but for the continued fog and bad weather at the end of the year. Another matter out of the control of the officers which prevented the economies being greater was that, by reason of the sliding scale, the wages bill was increased by £230,000, of which £140,000 was attributable to the operating departments. On the subject of wages generally, Sir Guy Granet gave a convincing answer to the suggestion that in times of depression it was labour and not capital that was asked to make concessions. He showed that on his railway, in 1913, £19,688,000 was paid in salaries and wages, and £18,283,000 in interest and dividends, whereas in 1925 £48,287,000 was paid in salaries and wages, and £18,236,000 in interest and dividends. Thus, while the amount paid to labour increased by 145 per cent., the amount paid to capital decreased by 0·26 per cent. In other words, the ratio of capital payments to labour payments was as 100 to 108 in 1913, but was as 100 to 265 in 1925.

The L.N.E.R. Meeting.

AT the annual meeting of the London and North Eastern Railway, Mr. William Whitelaw had to meet many criticisms, mostly unhelpful, of last year's results. Subject to one or two complaints of the general reduction of rates and fares made in 1923, the shareholders seem to have accepted the heavy fall in receipts as the natural consequence of bad trade conditions, and to have concentrated their attack on the moderate saving in expenditure and on the smaller deferred dividend. Savings in the locomotive coal bill and in salaries and office expenses were largely neutralised by the automatic increase of £170,000 to the Conciliation grades staff under the cost-of-living sliding scale, and by the £64,000 rise in local rates due to increased poundage and to other items beyond the control of the directors and officers. Fog, too, played its part in increasing expense and congestion in certain areas. Changes in traffic routes due to amalgamation have necessarily caused delay in settling the new normal traffic routes, and in deciding where expenditure on new facilities is most justifiable. Definite plans will, however, be submitted almost immediately to the directors for dealing with the movement of goods train traffic *en route* from the north to London, the working of which has not been satisfactory during 1925, and this expenditure should be more than

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recouped by the relief from congestion which it will bring. The two reasons given by the Chairman for the reduced distribution on the deferred stock were the possibility of delay in bringing the "standard charges" into operation, and the situation in the mining industry.

Southern Railway Meeting.

THE good results of electrification were mentioned by the Chairman of the Southern Railway at the annual meeting on February 25. Passengers to and from stations in the newly-electrified areas show an increase of 3,200,000, or just 12 per cent., as compared with the corresponding period of 1924. At present the increased revenue resulting from electrification meets the increased cost of the improved services, and is expected within a short time to meet also the interest on the capital expenditure. A further interesting point in connection with electrification was the Chairman's announcement of the board's decision gradually to replace the single-phase overhead system on the Brighton section by the direct-current system, the latter being adopted as the standard for the whole line. The Chairman referred to the gratifying response made by employees to the invitation to subscribe towards the new issue of debenture stock, which was fully taken up by the proprietors and the staff. With regard to the absence of dividend on the ordinary "B" stock, the Chairman repeated the directors' opinion expressed last year, that while reserves might properly be used to maintain dividends it was not justifiable to use them to increase the distribution. The company spent in 1925 over £2,000,000 out of reserve funds towards bringing stations, permanent way and rolling-stock to the required state of efficiency. Reference was also made to the expansion of the Continental traffic and the satisfactory behaviour of the two new vessels placed on the Folkestone and Dover routes.

Great Western Railway Meeting.

IN his address to the shareholders of the Great Western Railway Company at the annual meeting on February 24, Viscount Churchill gave another candid review of the railway situation. The chief trouble in 1925 on the Great Western was the depression in the coal trade, which mainly accounted for the decrease of £1,166,199 in the receipts from the railway and ancillary businesses. Such a substantial saving in expenses as £881,782 in a year when economies were exceptionally difficult was therefore a fine achievement on the part of the officers and staff together, to which the Chairman made appreciative reference. But he was disappointed with the results of reducing rates and charges, and expressed his decided opinion that had the railway companies—certainly the Great Western—not reduced their rates in August, 1923, they would have been able to pay their dividends without drawing upon reserves. He went on to point out that, apart from the 4 per cent. increase in "exceptional" rates made in 1913, railway transport was one of the few commodities which did not increase in price in the last two or three decades before the War, and gave some striking figures in support of this statement. In 1897 the Great Western Company purchased 1,110,000 tons of coal at an average pit-head price of 7s. 10·3d. a ton; the corresponding average in 1913 was 13s. 5·7d., and the 1,600,000 tons purchased in that year cost the company about £450,000 in respect of increased price alone. For the whole of the company's purchases of material there was an increase of 58 per cent. in the prices paid in 1913 compared with 1897. Contrasting the large increases in other costs with the moderate increase of between 50 and 60 per cent. in the charges for railway transport, Viscount Churchill repeated his warning of last year that if traffic did not improve an increase in railway rates was inevitable.

Metropolitan Railway Meeting.

ADDRESSING the shareholders at the Metropolitan Railway meeting, held on February 18, Lord Aberconway pointed out that the accounts compare with an exceptionally good year, in that during 1924 they had a very heavy traffic in connection with the British Empire Exhibition, while a tram and bus strike in the early part of the year threw a large amount of traffic on their line. The attendance at Wembley in 1925 was only about half that of the previous year, while their receipts from that source were not even half of what was derived from it in 1924, as, in order to assist the objects of the Exhibition, they had joined with the Exhibition authorities in reducing the price of the combined tickets. It was, therefore, not surprising that revenue for the past year was considerably less than in 1924. As, however, they had adopted the wise course in 1924 of using the greater part of their exceptional receipts in consolidating and strengthening their financial position in various ways, they were able, in spite of smaller revenue, to propose the payment of the same dividend as in 1924, and to carry forward practically the same amount. The only difference was that they had not repeated the transfer of £25,000 to the general reserve fund. That amount had been put to the reserve fund in 1924, in addition to the other special provisions then made, because the Exhibition business that came

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to them was in the nature of a windfall. Lord Aberconway then referred to the adoption of a scientific depreciation policy, leading up to the remark, "I think you will agree with me that the financial handling of this company can hardly be improved upon." After reference to the completion of the Watford Extension, the new works at Harrow, signalling developments, and the new works in hand on the Inner Circle between Euston Square and Moorgate, Lord Aberconway pointed out, in response to accusations of unpunctual working from outer suburban season-ticket holders, that "We have to work by seconds and not by minutes on the Metropolitan Railway." Reports received from their officers that morning showed the percentage of trains up to time and within two minutes of time as 92, as compared with 89·9 last month.

L.M.S. & G.W. Railways Joint Committee.

WHEN the grouping of the lines now constituting the London Midland and Scottish and the Great Western Railways was completed, there still remained in existence some joint committees charged with the management and maintenance of joint lines in which the two companies are interested. These included: Great Western and London and North Western Railways Joint Committee; Brecon and Merthyr and London and North Western Railways Joint Committee; Great Western and Midland Railways Joint Committee.

These separate committees, it was felt, could usefully be consolidated, and the necessary Parliamentary sanction was given by Section 31 (i) of the London Midland and Scottish Railway Act, 1925, which received the Royal Assent on August 7 last. This section provides that within six months of the passing of the Act the two companies should appoint a Joint Committee to be called "the London Midland and Scottish and Great Western Railways Joint Committee" for the management and maintenance of the railways, stations and works hitherto respectively managed and maintained by the four above-mentioned joint committees, and that the new committee should exercise and fulfil all the powers, rights, duties and obligations exercised by or imposed upon any of those four committees.

The London Midland and Scottish and Great Western Railways Joint Committee has now been constituted and is duly functioning

London Midland and Scottish Railway Directors—

Sir John F. Beale, K.B.E.
Mr. E. B. Fielden, M.P.
Sir W. Guy Granet, G.B.E.
Mr. A. H. Wiggin.
Sir Thomas Williams.

Great Western Railway Directors—

The Rt. Hon. Viscount Churchill, G.C.V.O.
Sir S. Ernest Palmer, Bart.
Sir Aubrey Brocklebank, Bart.
The Rt. Hon. John W. Wilson.
Captain F. Brian F. Bibby.

Mr. D. V. Levien, Secretary's Office, Great Western Railway Company, has been appointed Secretary to the London Midland and Scottish and Great Western Railways Joint Committee.

L.N.E.R. Musical Society.

THE third Bohemian Concert of the 1925–26 season (the 18th) was held on Wednesday, February 24, in the Hamilton Hall, Liverpool Street Station Hotel, and as usual a highly interesting and popular programme was presented. Colonel Galloway conducted the orchestra in several items, but under doctor's orders confined himself to these, the remainder being performed under the direction of Mr. E. R. Wilby. The soloists were Miss Enid Cruickshank and Mr. Howard Fry. In one of the former's solos Mr. F. Momber played a violoncello obligato. The special item of the programme was, however, the playing by the orchestra (under Colonel Galloway) of the second movement of Schubert's "Unfinished" Symphony.

The chair was occupied by Mrs. Alison Brown, wife of Mr. C. J. Brown, Engineer, Southern Area. On the invitation of Mr. P. Syder, Mr. L. Sidney Smith, Hotels Manager, proposed a vote of thanks to Mrs. Brown for presiding, to which Mr. Brown replied on behalf of his wife.

Reliability of Locomotive Drivers.

SOME highly significant figures, upon which not only the railway companies of this country but also the locomotive enginemen employed by them can be heartily congratulated, were given by Mr. W. J. Thorrowgood, Signal and Telegraph Superintendent, Southern Railway, in a paper entitled "Signalling from a Driver's Point of View," which he presented at a meeting of the Institution of Locomotive Engineers on February 26. Mr. Thorrowgood stated that the number of collisions during the year 1924—the latest date for which returns are available—due to drivers passing signals in the "on" position was three. There are 38,180 engine drivers in Great Britain, so that the ratio is one failure for every 12,727 men. There were three collisions due to enginemen failing to give effect to regulations or misjudgment, and five due to divided responsibility, and if the whole 11 accidents are taken as applicable to drivers, then there

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was one collision to every 3,289 men per annum. A driver, it may be taken, travels 130 miles per day for 326 days in the year; thus the figures prove that one collision due to drivers takes place for every 138,960,000 train-miles run. This small number of collisions shows the high degree of efficiency of locomotive drivers and the care they take, and to increase this efficiency would, as Mr. Thorrowgood remarked, require a perfect system of automatic train control, as with the multiplicity of apparatus and mechanism which is liable to accidents, in a similar way to all other mechanisms, the number of failures due to the additional apparatus introduced may be easily appreciable.

First-Class Traffic.

THAT the "third class pays for the first' and that the provision of first-class accommodation is a wasteful luxury are theories which have gained a certain amount of popularity with the travelling public. They are not warranted by the facts, as Sir Guy Granet showed by the interesting figures he quoted at the annual meeting of the London Midland & Scottish Railway. Taking the entire seating capacity of the passenger stock on that line, every first-class seat provided earned in 1925 a gross income of £23 15s., and every third-class seat a gross income of £25. This opens up an interesting field of inquiry, and an examination of the accounts of the other three great companies shows that each first-class seat provided by them earns a substantial amount, though the proportion of first-class seat earnings is not so high in relation to third-class seat earnings as on the London Midland & Scottish. In the statistics of electric vehicles the seating capacity is not separated into first and third by the three other companies, so a method has been adopted of allocating one-fifth of the seating capacity of electric vehicles to first-class and the remaining four-fifths to third class. On this basis the Southern Railway secured in 1925 gross earnings of £32 19s. 5d. for each first-class seat provided, and £36 6s. 9d. for each third; the corresponding earnings on the Great Western were £20 13s. 4d. first and £30 10s. 2d. third, and on the London & North Eastern £20 18s. 1d. first and £24 12s. 9d. third.

Queensland Government Railways.

MR. W. D. WARREN, now resident in Queensland, sends several photographs, one of which is reproduced. This shows the second part of the Brisbane-Sydney mail train leaving Toowoomba, attached to a standard 4-8-0 locomotive, No. 175. The train in question has frequently to be duplicated at holiday periods. The engine illustrated is of a class generally regarded as adapted for mixed traffic, and has coupled wheels 3 ft. 9 in. diameter and 17 in. by 22 in. cylinders. Mr. Warren also sends a print of the Brisbane-Sydney Limited mail train passing the 100½ mile post from Brisbane shortly before reaching Toowoomba At this place engines are changed, though usually a 4-8-0 of the class illustrated in the photograph reproduced is also employed on that section. The second stage finishes at Wallangarra, the New South Wales-Queensland border station, where it is necessary to change trains owing to the difference of gauge.

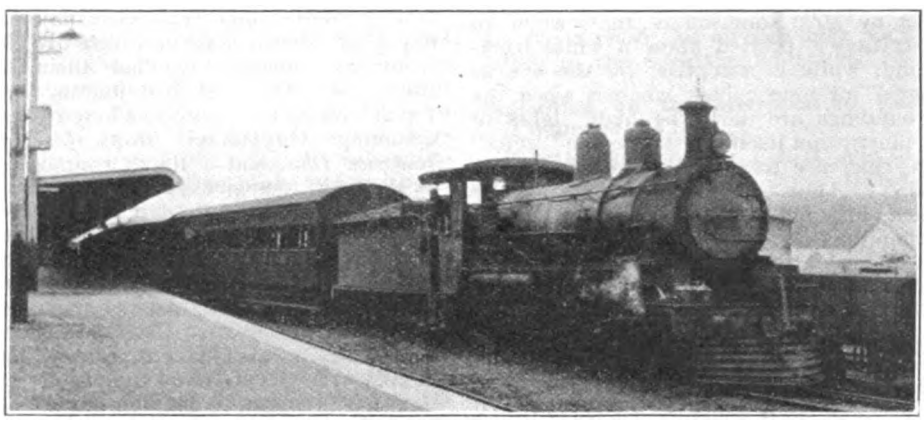

Photo.] [*W. D. Warren.*

SYDNEY MAIL TRAIN AT TOOWOOMBA, QUEENSLAND GOVERNMENT RAILWAYS.

Queensland 4-8-0 locomotive No. 175. (3 ft. 6 in. gauge).

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"Masked" Illustrations.

MR. H. A. ROBINSON, 7, Wilton Road, Rock Ferry, Cheshire, points out that, if illustrations, such as those reproduced in THE RAILWAY MAGAZINE are viewed through a black or dark border screen, so that they are seen within a dark background instead of the usual white background, there is often a great apparent improvement in brilliancy, and frequently details can be more clearly seen. The idea is not a new discovery, in that art publications often present reproductions with a dark border, and occasionally illustrations in our own pages are thus presented. Mr. Robinson suggests, therefore, that masks should be prepared by cutting from sheets of black or dark paper (he is willing to supply specimens, 6d., post free, to interested readers), and that illustrations should be viewed in this way. The explanation as given by Mr. Robinson is that, when an illustration is printed upon a white background, white is accepted by the eye as "zero" for tone values, whereas when the surroundings are dark the high lights of the illustration itself constitute the "zero" with reference to which other tones are graded. Thus, the sky, which usually comes out grey as compared with a white surrounding, is then regarded substantially as white, as also other high lights, so that the darker details are given a corresponding apparent increase in distinctiveness.

The Scottish Internationals.

SATURDAY, February 27, was a busy day for the railways serving Edinburgh and Glasgow, and especially for the sections between these two cities; for on that day were played two International football matches between Scotland and Ireland; Rugby at Murrayfield, Edinburgh, and Association at Ibrox, Glasgow. Unfortunately the clerk of the weather was not favourable to the fixtures, for it poured rain from morning to night, with the exception of an hour or two during the afternoon; but in spite of these adverse conditions, it is estimated that 40,000 people witnessed the Rugby match, and over 30,000 the Association. A large proportion of these were conveyed by rail to the respective arenas, both of the railway companies concerned giving ample facilities for this purpose. Return tickets at single fares were issued between Edinburgh and Glasgow both ways, which is a very rare occurrence, and these were available for the whole day from Glasgow to Edinburgh; but for some reason they were only made available for the afternoon from Edinburgh to Glasgow by certain trains. From Glasgow the L.N.E.R. ran no fewer than six special trains to Edinburgh, two of these being dining-car expresses, and four of these returned in the evening with non-dining passengers, diners being obliged to travel back by the ordinary express at 6.30 p.m. All these trains ran to the Waverley station, but facilities were provided for travel thence by the suburban line to Gorgie station. Similar facilities were provided by the L.M.S. Railway, whose Murrayfield station is the nearest to the ground. At Glasgow, passengers were obliged to travel to Queen Street, L.N.E., and the three L.M.S. termini; but passengers to the latter were able to complete their journey by rail from the Central station to Ibrox, or from Buchanan Street and St. Enoch to Copland Road station on the Glasgow Subway.

"Although not a 'Soccer' enthusiast," writes Major A. R. Munro, "I had occasion to travel to Glasgow and back by the L.N.E. route, and was very favourably impressed by the way in which two of the 'Director' engines handled their heavy trains. On the westward journey by the 1 p.m. dining car express, allowed 65 mins. including Haymarket stop, No. 6400, *Roderick Dhu*, had a 10-car train weighing at least 330 tons gross, with every compartment and corridor full; but kept exact time in spite of this and the heavy rain and strong head wind, which added to the difficulty of the task. On the return journey No. 6379, *Baron of Bradwardine*, had an extra coach to pull, bringing the gross weight up to nearly 345 tons; but also made a punctual arrival at Waverley. On both these runs I was struck by the steady running of the engines both up and down hill, there being no spectacular feats of speed, but a steady pull in both directions; and the 15 m.p.h. limit through Falkirk Tunnel was scrupulously observed."

A Survival of Ancient Days.

"MOST travellers between Edinburgh and Glasgow by the L.N.E. route," says Major A. R. Munro, "have no doubt observed that, between Bonnybridge and Castlecary stations this line is paralleled for some distance by the L.M.S. line from Perth and Stirling; and also, at a somewhat greater distance, by the Forth and Clyde Canal. On a recent visit to this district I found what I think must be a unique state of affairs, at least as affecting two main lines of such importance. At many places in Scotland there are what are known as 'Kirk Roads,' formed probably centuries ago to allow of easy access to the parish kirks, without reference to the existence of public roads; and these form inextinguishable rights-of-way. In this case the 'road' (actually a faint foot-track) crosses within the space of about half a mile

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the canal and the two railway lines, the access to the latter being in one case a swing gate, in the other stepping-stones let into the dyke which bounds the railway company's land. Across the canal a path is provided over one of the lock gates, which was presumably placed there to provide this method of transit and avoid a bridge which would have been otherwise necessary. When one considered the precautions that the railway companies take to keep trespassers off their property, and especially off their main running lines, this circumstance is of increased interest, as they are here obliged not only to permit of the crossing of the line, but to facilitate it!"

Snow and Railway Signal Observation.

About 3.26 a.m., on December 21, a down newspaper and mail express from Edinburgh to Glasgow, drawn by 4-4-0 engine No. 6384, when travelling at considerable speed, collided at Linlithgow, L.N.E.R., with the front portion of the 11.35 p.m. Niddrie West to Bo'ness Junction down goods train, which was being propelled into a siding on the down side of the line. The express was a non-passenger-carrying train, and its sole occupants, riding in the front brake van, were the guard and the newspaper attendant. Both had miraculous escapes, the former suffering from shock and a bruised foot, while the latter was merely shaken. The fireman of the goods train was also slightly injured. The passenger train consisted of 14 miscellaneous vehicles weighing 223½ tons. The goods train was being worked by 0-6-0 locomotive No. 9756. Weather conditions were very unfavourable, and the spectacles of many of the down line signals between Edinburgh and Linlithgow had become partially obscured. Otherwise, however, Lieut.-Colonel A. H. L. Mount, reporting on the accident, considers that atmospheric conditions were in no way abnormal, and that the conditions of visibility of the Linlithgow signals, though not good, were better than would be supposed.

The accident was attributed to the express driver's disregard of signals, and is classed as a serious case of heedless running. A certain degree of blame is also placed upon the fireman. The fact that this express had been driven by the particular driver for eight years, and was but rarely stopped at Linlithgow, causes the inspecting officer to adopt the view that his failure on this occasion was the result of familiarity leading to carelessness, and it was fortunate that a speed restriction, though not conscientiously obeyed, was in force for this train when passing through the station. Colonel Mount expresses the view that this was an accident of the type which would have been preventable by some system of automatic train control. The report concludes with the following remarks:—

The principal feature of the case was obscuration subsequent to and as the result of driving snow—of the lights of signals carried upon high posts. Trouble of the kind is difficult to avoid with the ordinary type of semaphore fitted with oil lamp and spectacle glass. It may be observed, however, in this connection that in the case of modern colour light signals failure from this cause is less likely to result owing to their design, form of construction, high penetrative power and low height. Such experience as has been obtained in this country tends to show that the comparative immunity to be expected in this respect is, in fact, realised. On lines, therefore, where circumstances are favourable to the installation of this system, the more arresting indications thus afforded under adverse weather conditions will go far to increase the already high factor of safety in the operation of traffic.

Signalling on the Metropolitan Railway "Widened" Lines.

The tracks used by L.N.E. and L.M.S. trains between King's Cross (Met.) and Moorgate, and, to some extent, by G.W. goods trains to and from Smithfield, and known as the "widened" lines of the Metropolitan Railway, were not provided as a supplement to existing lines, as widenings usually are, but were part of the scheme for the original Metropolitan Railway as between King's Cross and Farringdon Street, with the subsequent extension to Moorgate. Owing to engineering difficulties, the widened lines east of Farringdon Street were opened before those west of that station. The latter were brought into use on February 17, 1868, in anticipation of the opening of the Midland line from Bedford to London for passenger traffic on July 13 of that year. The widened lines have, however, never been used by Metropolitan trains, and so have continued to be operated under mechanical signal control, and were not provided with automatic signals when the Circle lines were equipped.

In connection with the Metropolitan improvements now in progress between Euston Square and King's Cross, which will give the Inner Circle route direct connection with the up widened line at King's Cross, automatic signalling is being installed on both up and down roads throughout the widened lines section. The up line between King's Cross and Farringdon Street is being equipped for electric traction, while between Farringdon Street and Moorgate both the widened lines are being so treated. At Moorgate L.M.S. (Midland) trains have been

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transferred to the furthest platform, at one time used by S.E. & C. trains, while the platform for so long used by Midland trains has been reconstructed for use by Metropolitan trains. There is a cross-over junction between the Circle and widened lines at the west end of Farringdon Street and another at Moorgate.

Details of Equipment.

A NEW signal-box is being provided at Moorgate in place of the existing one. It is a double-storey fireproof building of the same type as that at Baker Street. The new box will contain a mechanical frame of 44 levers of the Metropolitan pattern. The signals will be electrically operated through circuit-breakers on the mechanical levers. The signals at Moorgate and King's Cross and throughout the widened lines will be of the short-range two-aspect light type, Metropolitan pattern. All stop signals will have electrically-operated train stops.

The most interesting feature of the work is that the new facing points near Euston Square, though 660 yards distant, will be operated from the existing King's Cross "C" box by electrical power. By the provision of track circuits, an illuminated diagram and other safeguards, the junction from and to the L.M.S. Railway will also be connected to the "C" box and the Midland Junction box dispensed with. An illuminated diagram is also being provided in Moorgate box. A new departure in that at King's Cross will be that the destination of approaching trains will be described thereon. The whole of the signalling—mechanical as well as electrical—is being carried out by the Westinghouse Brake & Saxby Signal Co. Ltd., 82, York Road, King's Cross, N. 1.

The Social Side of the Railway Service.

A CENSUS recently taken shows that something like 650 social and athletic clubs and societies, whose membership is limited to employees of the London Midland and Scottish Railway, exist throughout the country. The company employs about 270,000 persons, and their interests range from football on the one hand to music and horticulture on the other. In football alone there are no fewer than 150 association clubs, forming the biggest private federation of football organisations in the country. In addition there are 69 combined sports clubs, embracing golf and all the principal outdoor games. Rifle shooting, musical, dramatic, literary, debating, photographic, and wireless clubs are also included in the varied list.

Particularly interesting features are the 38 federated horticultural societies in different parts of the country and the newly-formed "fur and feather" society for bird and rabbit breeders, whose members are primarily interested in the stimulating and production of home-grown food. Many of the clubs and societies are entirely self-supporting, but where there is a real need for establishing one on a sound basis, the company, it is explained, afford assistance in the way of money, grants of land for football and other sports, and accommodation for clubhouses, pavilions, and dressing-rooms. Membership fees and subscriptions are invariably low.

Metropolitan Railway Athletic Association Concert at Queen's Hall.

As usual at the Metropolitan Railway Athletic Association's annual Bohemian concerts at the Queen's Hall, Langham Place, W., a large and appreciative audience was attracted there on Friday, February 19, when the fourth of the series was presented. A pleasant feature of these entertainments is that they largely partake of the nature of a family gathering; this was certainly the case recently, when, as it seemed, every member of the audience was either related to everyone else or could boast of a nodding acquaintance. As usual, also, the programme was on popular lines and a very full one. It fell to the lot of Mr. Alfred Harriss, at the grand organ, to "play the people in," from a quarter past seven to the half-hour, when the band of H.M. Grenadier Guards, led by Lieut. G. Miller, L.R.A.M., opened the proceedings with their accustomed efficiency and to the obvious enjoyment of their numerous hearers. They played several selections during the evening, finishing up with the Scottish patrol, "The Gathering of the Clans."

Mr. Berkeley Mason was at the piano during the progress of the many popular turns, the latter including such favourites as Mr. Ben Lawes, Mr. Thorp Bates, Miss Edith Furmedge, Mr. Tom Clare, Miss Flora Woodman, Messrs. Charles Clapham and Billie Dwyer, Mr. John Turner, Miss Edith Faulkner, Mr. Archie Graham and "Watty," and last, but by no means least, Mr. Bransby Williams. These artistes provided a feast of good things. Encores were the order of the evening, and so popular were some of the turns that it really looked, once or twice, as if the entertainment would not conclude until midnight. All concerned are to be congratulated on a very successful evening.

The arrangements were in the hands of a concert committee consisting of Mr. T. Wilding, chairman; Mr. Sidney Brown, hon. musical director; and Mr. W. R. Squire, hon. secretary. These gentlemen were assisted by a number of stewards and pro-

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grammie-sellers, the latter under the direction of Mr. W. M. Robinson.

Amongst those present were :-

Metropolitan Railway : The Right Hon. Lord Aberconway, P.C., Chairman ; Sir Clarendon G. Hyde, Deputy-Chairman ; the Hon. Evelyn Hubbard, Director ; Mr. R. H. Selbie, C.B.E., General Manager and Director, and the following officers : Mr. H. S. Stewart, Mr. E. A. Wilson, Mr. W. Holt, Mr. John Wardle, Mr. W. M. Ballingall, Mr. G. Hally, Mr. E. Sutton, Mr. P. R. Boulton, Mr. H. Gibson, Mr. C. W. Clark, Mr. G. Morkill, and Mr. W. Wilding (Chairman of Concert Committee). *Great Western Railway :* Mr. F. R. E. Davis, Mr. H. L. Wilkinson, Mr. F. R. Potter, Mr. R. Cope, Mr. Anderson and Mr. C. R. Dashwood. *London and North Eastern Railway :* Mr. C. J. Selway, Mr. G. Marshall, Mr. P. Syder, Mr. W. Lees, and Mr. A. White. *London Midland and Scottish Railway :* Mr. John Quirey. *Southern Railway :* Mr. A. Howie and Mr. G. Ellson. *Underground :* Mr. W. E. Every. *Railway Clearing House :* Mr. Painter.

Metropolitan Railway Improvements at Edgware Road.

At Edgware Road, on the Metropolitan Railway, there is being provided one of the most convenient stations for operation that can be found anywhere. There are to be two island platforms, on the outer sides of which will be the two main lines. On the inner sides will be two loop lines, and outside the down main line will be two sidings. The necessary junctions will be so laid that three platform roads will be available for the departure of eastbound trains and three for the departure of westbound trains. A new signal-box is being provided which will contain an all-electric power signalling locking-frame. The feature of special interest is that Praed Street Junction, 900 ft. distant and in a tunnel, will be operated therefrom, and the existing signal-box there dispensed with. That signal-box is noteworthy inasmuch as it was the first on the Metropolitan to have power signalling and the first box in London to have an all-electric frame. It was brought into use on July 26, 1908, and only five working levers are required. Provision is being made in the new box at Edgware Road for the junction with the proposed tube railway from Willesden Green. As at King's Cross box and at Baker Street, the illuminated diagram will show the destination of the trains approaching from Bishop's Road, Praed Street, and Baker Street.

A Locomotive Pioneer.

At the annual dinner of the Institution of Locomotive Engineers, which took place on Friday, February 19, reference was made by Colonel E. Kitson Clark, in proposing the toast of "The Visitors," to the centenary of the death of Matthew Murray, who, as Colonel Clark stated, was responsible for the first commercially successful locomotive run in this country. Murray was born in 1765, of humble parentage, at Newcastle-on-Tyne or Stockton-on-Tees, and served his time as a blacksmith. His inventive genius was pronounced, and he was awarded a number of patents, the subject matter of which varied considerably, all, however, applying in one form or another to the science of engineering. In 1810 Murray was approached by John Blenkinsop, of Middleton Colliery, and asked to build a locomotive to run on the wagon-way to Hunslet. The line was laid with Blenkinsop patent rack rails in 1811, and the locomotive was built in 1811-12. It embodied an important improvement, which has persisted throughout the intervening period of approximately 115 years, namely, the use of two cylinders with cranks at right angles. There are, of course, numerous three- and four-cylinder engines with other crank settings in use at the present time, but the bulk of locomotives still has the two-cylinder 90-deg. crank arrangement. Colonel Clark, in his remarks, referred to the fact that a wreath was to be placed on the Murray memorial in Leeds on Sunday, February 21, in recognition of the great work performed by this pioneer in the early period of railways in this country.

Race Specials in India.

Mr. A. J. Gush, writing from Calcutta, sends particulars of special trains run for the Lucknow Spring Races in January on the East Indian Railway. The following particulars, as given in the advertisement, read interestingly :—

"A Race Special train on the timings shown below will be run from Howrah to Lucknow and back to enable the public to attend the Lucknow Spring Races to be held at Lucknow on the 26th, 28th (Civil Service Cup day) and 30th January, 1926. Accommodation will be provided on the Race Special for about 48 first and 20 second-class passengers and for about 60 servants.

"The outward and return Race Specials will be run on the dates and to the abstract time-table noted below. A restaurant car will run attached to the Race Specials throughout. Lunch and dinner will be served in the car and passengers will be informed by the Car Manager when meals will be served *en route*. Passengers are requested to send in their applications for berths to the Station Superintendent, Howrah, early to avoid disappointment."

The time-table is given in the American

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style, with the station names and other particulars in the middle, the up train reading downwardly on the left and the down train reading upwardly on the right. The up train left at 10 a.m. (Calcutta time) on January 24, and Howrah at 9.36 a.m. (standard time). Calls were made at Asansol, Patna Junction, Dinapore, Gomoh, Gaya, Moghal Serai, Benares Cantonment, Partabgarh, to Lucknow, the arrival being at 7.45 a.m. on January 25. The return train left Lucknow at 10.30 a.m. on January 31, and, travelling *via* the Grand Chord, was due at Calcutta at 7.24 a.m., on February 1. Mr. Gush remarks as follows :—

"You will note that the train from Calcutta is the Up train and *vice versa*. The small number of passengers provided for and provision for servants will also interest you, as will the Restaurant Car which runs the whole way. I may add the following distances for your information :—

Miles.		
	Calcutta	
0	(Howrah station).	
132	Asansol.	
338	Patna Junction.	
344	Dinapore.	
	Gomoh	Separate train from these places joining the special at Moghal Serai. Gomoh is 232 miles and Gaya 127 miles from Moghal Serai.
	Gaya	
418	Moghal Serai.	
429	Benares Cantonment.	
498	Partabgarh.	
606	Lucknow."	

The Highland Railway of To-day.

In view of references made by Mr. Allen, in his article published in the January Railway Magazine, and of comments by Major Munro, published in "Pertinent Paragraphs" of the same issue, the following notes are sent by "A.D.C." :—

"While not attempting to contradict Mr. C. J. Allen's remarks as to present-day running, there is no doubt that those who live in the North of Scotland have benefited very much since the regretted disappearance of the Highland Railway by the appearance of more modern rolling-stock, and above all by much greater punctuality, especially during the heavier traffic of the summer months. I do not say greater speeds, but then the old Highland railway never set out to achieve much in that respect.

"Most, if not all of the old Highland 6-wheel and 4-wheel carriages have disappeared, and the sidings of the smaller stations round Inverness may be seen filled with these old carriages, the numbers having been obliterated. Those of the bogie Highland carriages which have been repainted, seem to have had 186 prefixed to their original number.

"In the goods vehicles, the chief advantage of the grouping seems to have been that there is a much greater number of cattle trucks, of 'large and medium' sizes moreover, available. In old Highland days at the times of the annual autumn stock sales, there was always a pronounced shortage of these trucks, which even the distinctive Highland double-decked sheep vans did not allay. Vanishing, too, are the 4-wheel fish trucks which are now giving way to covered vans, which I understand convey fish in better condition.

"In Highland days, the fact that a special train was following a train which ran according to the time-tables was indicated by the engine of the latter train carrying on the leading buffer-beam a large red canvas disc, on which was painted the words 'Engine Following' and at the rear end of the last vehicle was carried a board, similarly painted with the words 'UP' or 'DOWN.' Now the van or last vehicle carries what used to be the board carried on the engine, viz.: 'ENGINE FOLLOWING' or alternatively, two tail-lamps. Curiously enough in all the many photographs of Highland engines and trains which have appeared in your paper, I have only once seen one in which the engine carried this board, though, owing to the large number of specials run on the Highland line, the board was very frequently to be noted by the observant.

"I have before me the L.M.S. Summer Time-Tables for 1925 for Scotland. In them there is a train shown as under :—

Inverness leaves	3.20 p.m.
Newtonmore leaves	4.55 ,,
Perth, arrives	7 ,,

"I never travelled by this train, so do not know if there were any working stops, but I do not remember a train from Inverness to Perth with only one booked stop in any other year.

"In the same time-table some of the conditional stops of the 4.35 p.m. *ex* Inverness (at stations where marked 'F' to take up for England) are shown at times which are obviously much in advance of the working time-book times, whatever they may be. I suppose this was done to ensure intending passengers arriving in good time at the stations, but it destroyed much of the interest in timing the train to see if time was lost or gained, as most of the times for these intermediate stops were quite impossible of attainment.

"Most of the Highland engines seem to

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have been repainted, including the small Skye Line engines, 32-34, 48, 70, 85-88."

The World's Busiest Station.

AUSTRALIA has claimed that Flinders Street station, Melbourne, is the busiest in the world, and this claim is pressed by the publication in the January, 1926, issue of *The Victorian Railways Magazine*, of a frontispiece showing Flinders Street Station with a caption, "The World's Busiest Station," and remarks appertaining thereto in the magazine. In the Melbourne *Age* last year it was stated that, on an average, 324,000 people passed through Flinders Street, Princes Bridge and Spencer Street Stations, and that the tally at the Flinders Street barriers was 238,000. Believing that one or two British stations could show bigger figures than this, we obtained information relative to Liverpool Street and Waterloo, and found that, at the former, from figures obtained as the result of a train count towards the end of 1924, the total number of passengers was 244,336, and with the addition of 47,431 at Fenchurch Street, over 291,000. Waterloo, on the other hand, could only show 146,000, but for the whole of the London termini of the Southern Railway a figure very close to half a million was reached. The figure now put forward officially in regard to the principal station in Melbourne is 290,000 daily, but it is not quite clear whether this includes Princes Bridge, which is adjacent to, but in a sense distinct from, Flinders Street. Assuming the two to be included, the Liverpool Street plus Fenchurch Street figures at the end of 1924 still lead, but if Flinders Street and Liverpool Street individually are to be compared, it would appear that Flinders Street has a bigger passenger traffic density than any station in Great Britain. Flinders Street Station is of the through type, and all the suburban services in the Melbourne area are operated electrically. There are 16 platforms at the station, and during the day 2,450 electric and 260 steam trains are handled.

A Unique Signal-Box.

IT is now almost exactly 20 years since the box at Kennington Road on the Baker Street and Waterloo Railway was brought into use. The line to Elephant and Castle was not completed then, so Kennington Road was the terminus. The signalman had to handle a three-minute service, work a crossover for each train, and yet he could not see train, road, points, nor signals. He had, though, an illuminated diagram, and that was quite sufficient. There have been other cases where men have had to work in such figurative darkness, of which a leading example is that at Camden Town Junction, "Hampstead" section, London Electric Railway, opened in April, 1924. Another remarkable work of that character will be the signal-box at King's Cross referred to on page 322. Therefrom will be worked the facing and trailing junctions for the L.N.E.R., the double junction for the Midland section of the L.M.S.R., and the facing points in the up Circle line of the Metropolitan leading to the new connection to the up "widened" line. All these points, and the signals concerned, will be out of the signalman's sight, but an illuminated diagram will compensate for that. The Metropolitan signal-box at Midland Junction will also be dispensed with. In the United States one of the outstanding illustrations of such signalling is in the suburban station of the Grand Central Terminal, New York City. That has been made possible by the use of a "track indicator"—the American term for the illuminated diagram—and it is interesting to know that this is of purely British origin.

American Distance Record.

WE have commented previously upon the tendency now prevalent in the United States for increasing the total lengths of runs made uninterruptedly by the same locomotive, also the length of the non-stop runs in that country. A record, which presumably will stand for some time, was made during the latter part of last year on the American Great Northern Railway, which must be regarded as a most remarkable performance on the part of a single locomotive. A round trip of 3,571 miles was made by the same engine from Seattle to St. Paul and back, the time occupied being 99 hours 45 minutes, including, of course, all the necessary stops for coaling, water replenishment, &c. In the ordinary working of these trains, the average distance travelled by an individual locomotive in accordance with the regular schedule is that between division points, which averages from 150 to 200 miles The engine employed for the record run was one of a series of oil-burning passenger locomotives, and no effort was made to prepare it in a special manner for the continuous round trip. In the course of this long run 13 enginemen each way were successively in charge of the engine. In the eastbound direction, with 19 vehicles, a banking engine was used for 18 miles, while ascending the Rocky Mountains. Some nine or ten hours were spent in the engine-house at St. Paul, and the average speed throughout the trip worked out at something approximating to 32 m.p.h. The great test of performances of this character is, of course, the extent to which the grate can be kept clean, a problem much simplified where oil is burnt as fuel.

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T.O.T. Philharmonic Society in "Patience."

In their commendable excursions, during the past five years, into the delightful domain of Gilbert and Sullivan the T.O.T. Philharmonic Society have staged many notable productions, but it may be doubted whether they have ever done anything better than their presentation of "Patience; or, Bunthorne's Bride," at the New Scala Theatre, Charlotte Street, W., on Thursday, Friday, and Saturday, February 18, 19, and 20. For an amateur show it came very near perfection—not only as regards the business of the stage, but also the masterly way in which it was handled from the vocal and instrumental standpoint. The T.O.T. Philharmonic Society are fortunate in having at the head of things two men who have a thorough grip of their respective duties—to wit, Mr. Emil Hardy, stage manager and producer, and Mr. Charles Lambert, musical director. In "Patience" the work of these gifted twain exceeded expectations, and was greatly appreciated by all concerned.

Certainly, they were well served by the principals. Miss Hilda Kemp's performance of the dairymaid was singularly meritorious, alike in the naturalness of her manner, her clearness of enunciation, and her excellent singing. Mr. Alec Pleasance as Reginald Bunthorne was the best amateur exponent of that character we have ever seen, and a more artistic performance could not have been desired. As Archibald Grosvenor, Mr. John Priestly also did extremely well; while Messrs. Arthur Carter, Cyril Corker, and Thomas Dean put in some good sound work as the Colonel, the Major and the Duke, respectively, their doings in the delightful quintette in the second act being especially praiseworthy. Miss Dorothy Riley was cast for the Lady Jane and did very well therein, though she scarcely suggested the "massiveness" that one usually associates with the part. The Ladies Angela, Saphir, and Ella were competently played by the Misses May Savile, Queenie Thomas, and Elsie Nicholl; while the tiny part of Bunthorne's voiceless solicitor was enacted with a good sense of character by Mr. John Everson.

Reference should also be made to Mr. George Murlis (accompanist at rehearsals), Mr. E. G. le Pelley (assistant stage manager), and Mr. T. J. Clancy (acting manager). We note with interest that the Society's next production is to be Messager's tuneful, light opera "Veronique."

Isle of Wight Locomotives.

Mr. C. G. Woodnutt points out that, in the re-numbering, the I.W.C. engines retained their old numbers, *i.e.*, 4 to 12, F.Y.N.R., Nos. 1 and 2 became 1 W and 2 W, and the I.W.R. engines became 13 W to 18 W inclusive. This leaves No. 3 blank because, for several years, the I.W.C. have had no locomotives of this number. Their No. 3 was a 0-4-2ST used for shunting at Medina Wharf, and was sold to a private firm in either 1917 or 1918. No. 4 was a 2-4-0T, formerly *Cowes* of the Ryde and Newport Railway, and has now been withdrawn from service. This explains why Nos. 3 and 4 are blank in the "Wz" list of the Southern Railway. The 0-4-4T's from the L.S.W. section take the Nos. 19 W to 26 W. The accompanying list, for which we are also indebted to Mr. C. G. Woodnutt, shows the locomotives now running in the island.

No.	Type.	Shed.	Remarks.
1W	0-6-0ST	Newport	Late F.Y.N.R., No. 1.
2W	0-6-0T	Newport	Late F.Y.N.R., No. 2, and L.S.W.R., No. 734; originally L.B.S.C. "Terrier," No. 46.
5W	2-4-0T	Ryde	Late *Osborne*, of Newport and Ryde, and late I.W.C.R. No. 5.
8W	2-4-0T	Ryde	Late No. 8, I.W.C.R.; together with No. 5 works the Bembridge branch.
9W	0-6-0T	Newport	Late I.W.C.R. No. 9 (L.B.S.C.R. "Terrier").
10W	0-6-0T	Newport	Late I.W.C.R. No. 10 (L.B.S.C.R. "Terrier").
11W	0-6-0T	Newport	Late I.W.C.R. No. 11 (L.B.S.C.R. "Terrier").
12W	0-6-0T	Newport	Late I.W.C.R. No. 12 (L.B.S.C.R. "Terrier").
13W	2-4-0T	Newport	Late *Ryde* of I.W.R., believed to be the oldest engine in Britain on regular duty.
14W	2-4-0T	Newport	Late *Shanklin*, I.W.R.
16W	2-4-0T	Newport	Late *Wroxall*, I.W.R.
17W	2-4-0T	Newport	Late *Brading*, I.W.R.
18W	2-4-0T	Newport	Late *Bonchurch*, I.W.R.
19W	0-4-4T	Ryde	Late L.S.W.R., No. 206.
20W	0-4-4T	Ryde	Late L.S.W.R., No. 211.
21W	0-4-4T	Ryde	Late L.S.W.R.
22W	0-4-4T	Ryde	Late L.S.W.R.
23W	0-4-4T	Ryde	Late L.S.W.R.
24W	0-4-4T	Ryde	Late L.S.W.R.
25W	0-4-4T	Newport	Late L.S.W.R.
26W	0-4-4T	Newport	Late L.S.W.R.

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"The only other engine now running on the island is I.W.C.R. No. 7, a 2-4-0T still to be seen painted black with I W.C. on the tank sides. Nos. 3, 4, 6 (formerly I W.C.R. 4-4-0T *Ryde*, now scrapped), and 15 (formerly I W.R. *Ventnor*, now broken up), are blank Nos. It is expected that No. 17 W, *Brading*, will also be scrapped in the near future."

L.S.W. Locomotives.

JUDGING from correspondence, there seems to be a degree of confusion as to the various classes of main line locomotives on the South Western section of the Southern Railway, and while we cannot give detailed numbers, the following remarks may assist in clearing up the difficulty :—

The Adams' 4-4-0's were of two classes, both with outside cylinders, but one with 7-ft. coupled wheels and the other with 6-ft. 6-in. coupled wheels. Many of these, particularly the latter series, are now on the duplicate list. There were also the 0-4-2 mixed-traffics with 6-ft. wheels.

The Drummond 4-4-0's include several series, classifiable broadly as under :—

(*a*) Earlier 4-4-0's, 113, 290 and 702 batches with 6-ft. 7-in. coupled wheels, many now rebuilt and superheated.

(*b*) Four-cylinder non-coupled, of which No. 720 has an enlarged boiler. These also have 6-ft. 7-in. coupled wheels.

(*c*) 415 class, 4-4-0 large boiler, 6-ft. 7-in. wheels.

(*d*) 463 class, 4-4-0, larger version, 6-ft. 7-in. coupled wheels.

(*e*) 395 class, 4-4-0, 6-ft. coupled wheels

(*f*) Mixed traffic, 4-4-0's, 5-ft. 7-in.coupled wheels.

(*g*) Drummond 4-6-0 four-cylinder, with 6-ft. coupled wheels. There are two or three series of these and some have been rebuilt. Others have been "replaced" by new "King Arthur" class engines, with 6-ft. 7-in. coupled wheels. (This is the cause of a good deal of the apparent confusion.).

(*h*) Drummond 4-6-0 four-cylinder, with 6-ft. 7-in. coupled wheels. Some of these also appear to be replaced by new "King Arthur" engines, but have the same diameter of coupled wheels.

(*i*) Urie 4-6-0's, with 6-ft. coupled wheels.

(*j*) Urie 4-6-0's, with 6-ft. 7-in. coupled wheels. These are now named with the true "King Arthur" class.

(*k*) Urie 4-6-0's, mixed-traffic, with 5-ft. 7-in. wheels.

(*l*) New "King Arthur" class, with 6-ft. 7-in. wheels.

Although we cannot usually spare space for long lists of numbers, we shall be pleased to hear from readers who are in a position to correct, complete or amplify these notes and supply numbers of the engines in each series.

Post-Grouping Changes.

MR. E. R. BALL suggests that readers would be interested if the changes which have been produced by grouping could be analysed and described, and in connection with the late L.N.W.R. sets forth some of the possible headings, such as changed colours for locomotives and rolling-stock, new locomotive designs, discontinuance of naming for engines, non-use of long destination boards on principal trains, and tendency to do away with ringed signals on relief lines, and so on. In that so many of these changes are of an incidental character, while they can be paralleled on each of the other grouped systems, some being, in fact imperative if anything like uniformity of practice is to be secured, we do not see that there is scope for more beyond what has already been published in our pages. Many will regret the disappearance of the characteristic white upper panels of L.N.W. rolling-stock ; but obviously one livery had to be chosen, and advocates of Midland painting would probably have considered themselves equally aggrieved had North Western painting been selected instead. Similarly, many readers no doubt regret the passing of Great Eastern blue for engines, and of North Eastern lake for carriages, in the case of the L.N.E.R., or of the introduction of green for both engine and carriages throughout the Southern Railway system. The main point is, indeed, that grouping has rendered many changes inevitable, and that these changes, while pleasing some people, do not meet with the approval of others. Further, it must be remembered that the changes indicated are after all, mainly of a detail character, whereas the effects of grouping are actually much more far-reaching, though these aspects may not appeal so much to the general traveller and observer.

Concluding his letter, Mr. Ball asks when the practice of lining out with grey and red lines for L.N.W. locomotives was discontinued, and when the same company ceased to paint their carriage roofs white, points as to which information is lacking.

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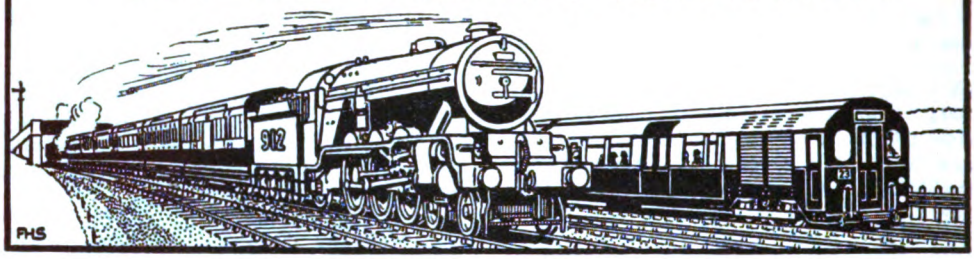
WHAT THE RAILWAYS ARE DOING.



In connection with the reorganisation of the commercial work of the London and North Eastern Railway in the London District, effective as from March 1, as mentioned last month, we are officially informed that the following appointments have been made in addition to those previously announced :—

Mr. E. B. Creasey, to be Assistant to the London City Manager.

Mr. W. V. White, to be Assistant Suburban District Goods Manager.

Mr. S. A. V. Gregory and Mr. R. R. Pettit, to be Assistants to the London District Passenger Manager.

* * *

New L.M.S.R. Appointments.

Mr. G. S. Rider, General Welfare Superintendent, to be Special Assistant for Stores, Stocks, &c., to the Chief Stores Superintendent.

Mr. S. J. R. Allwood, to be Electrical Power House Superintendent, Derby.

Mr. A. Walker, to be Goods Agent, Eglinton Street, Cook Street and West Street, Glasgow.

Mr. W. Marshall, to be Goods Agent, Hanley, in succession to Mr. E. C. Peacock, retired.

Mr. F. Radford, to succeed Mr. Marshall as Goods Agent, Longton.

Mr. S. Whittaker, to be Goods Agent, Kettering.

Mr. J. G. Hopwood, to succeed Mr. F. James as Stationmaster at Manchester (Victoria, Exchange and Salford).

Mr. A. Hewitt, to be Stationmaster at Blackpool, Talbot Road.

* * *

Mr. L. B. Billinton, C.B.E., formerly Locomotive Engineer of the late L.B. & S.C.R., has been appointed General Manager of R. Y. Pickering & Co. Ltd., carriage and wagon builders, Wishaw.

* * *

Mr. H. J. Stephenson, who has been appointed Assistant Locomotive Running Superintendent, North Eastern Area, L.N.E.R., commenced with the old North Eastern Railway Company at York in the Locomotive Works in 1881. After completing his apprenticeship he was placed in charge of the locomotive depots at Selby, Shildon and York, and in 1914 was transferred to Gateshead as Assistant to the Divisional Locomotive Superintendent in the Northern Division of the North Eastern Railway. Upon the retirement of that officer at the end of the year 1921, Mr. Stephenson was appointed to succeed him with the title of Assistant Running Superintendent, having charge of the Northern Division of the North Eastern Railway. On the formation of the L.N.E.R. Mr. Stephenson retained a corresponding position until receiving his present appointment.

MR. H. J. STEPHENSON,
Appointed Assistant Locomotive Running Superintendent, North Eastern Area, L.N.E.R.

* * *

The directors of the Great Western Railway Company have authorised the following appointments :—

Mr. O. J. White, District Goods Manager, Worcester, to be District Goods Manager, Shrewsbury, *vice* Mr. W. J. Rich, retired.

Mr. A. S. Mills, Assistant District Goods Manager, London, to be District Goods Manager, Worcester.

Mr. C. Furber, General Manager's office, Paddington, to be Assistant District Goods Manager, London.

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MR. JAMES WILSON, who has been appointed Solicitor (Scotland), London Midland and Scottish Railway Company, served his apprenticeship in law with Dr. David Murray, of Maclay, Murray & Spens, the legal adviser of the former Glasgow and South Western Railway Company. He attended the law classes, including the classes in International Private Law and in Procedure, at Glasgow University, and qualified as a Law Agent in 1916. He is a member of the Incorporated Society of Law Agents. Mr. Wilson entered the Solicitor's Office of the former Glasgow and South Western Railway Company in November, 1898, and was, prior to amalgamation, Assistant Solicitor of that company. Since amalgamation he has been Assistant Solicitor (Scotland) of the London Midland and Scottish Railway Company.

* * *

PULLMAN car facilities are being reintroduced on the "City Limited" express from Brighton at 8.48 a.m., and from London Bridge at 5 p.m. (Saturdays excepted), and on Saturdays from Victoria at 1.5 p.m. This innovation will be the means of affording facilities to the regular passengers on this important train for getting meals and other refreshments, as the stock is of the corridor type and will be connected to the car, so that refreshments will be served throughout the train. The car to be employed is the *Princess Patricia*, a handsome car which has been entirely brought up to date with the special object of service of the kind above mentioned. It has a large kitchen, and there is no doubt that it will be very popular for tea service on the down journey and for luncheons on the Saturday train from Victoria.

* * *

MR. CECIL J. ALLEN recently delivered a lantern lecture on "Our Railways and Locomotives," in Roscoe Place Wesleyan Schoolroom, Leeds. There was a large and representative attendance, including numerous officials and workmen connected with the railways and engineering works of the city. Mr. Allen presented his expert knowledge in a popular manner and closely held his audience for an hour and three-quarters. The Leeds City librarian, Mr. Thos. W. Hand, F.L.S., presided, and referring to Mr. Allen's monthly articles in THE RAILWAY MAGAZINE, said that he had been a reader of THE RAILWAY MAGAZINE from its first number, a like claim being made by the minister of the church, the Rev. Arthur Phillips.

* * *

IMPORTANT improvements are to be made at Victoria Station, Metropolitan District Railway, to provide more freedom for the movement of the traffic and improved facilities for booking. The present booking office will be demolished, three passimeter booking booths being installed instead. The new passimeters will be capable of delivering tickets at the rate of 150 per minute. These will be printed at the time of issue by means of a new form of electrical ticket-issuing machine. The whole of the printing of tickets will be done from a plain roll ticket, each roll providing for 4,000 separate tickets.

* * *

THE Southern Railway has arranged for the speeding up on this side of the Channel of the service between London and Ostend to obtain a saving of 25 minutes by giving a later start from London. The boat train now leaves Victoria Station at 9.15 instead of 8.50 a.m. The arrival time at Ostend remains the same, namely, 2.55 p.m. The 25 min. are to be saved on the railway journey between London and Dover and on the loading up of the boat.

* * *

THE L.N.E.R. have placed contracts with the Tees-side Bridge & Engineering Works Limited, Pease & Partners Limited, and Cochrane & Co. Ltd., Middlesbrough, for 4,500 tons of cast-iron chairs. An order has also been placed with Smith, Patterson & Co. Ltd., Blaydon-on-Tyne, for 1,500 tons of cast-iron chairs.

* * *

CONTRACTS have been placed and work is now in progress for the reconstruction of Waterloo, London Electric, station, in view of its future importance for exchange traffic. There will be three escalators from the top landing, below the Southern Railway passenger subway, to a lower landing at the present lift level, 56½ ft. below. The escalators will supplement the existing battery of four lifts. A passimeter booking hall will be provided on the upper escalator landing. New passageways will be involved at both levels.

* * *

THE old Hetton Colliery locomotive, which headed the procession of locomotive engines at the Railway Centenary celebrations in July last, has been presented by Sir Arthur Wood and the Lambton, Hetton & Joicey Collieries Limited, to the L.N.E.R. for preservation in the Railway Museum at York.

* * *

THE *Port-Carlisle Dandy* coach has been placed in its permanent position on the up main platform at Waverley station, Edinburgh, and is resplendent in a new coat of paint, which makes it look like a new creation, rather than an old veteran which has passed its days of usefulness.

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A GREYSTONES (Ireland) reader mentions that the Westland Row-Dun Laoghaire mail train on the Great Southern Railways of Ireland is now usually made up to include a first- and third- brake composite, weighing 28 tons; two first- and third- class composites, weighing 27¼ tons each; a third-class, weighing 22 tons; and a bogie van, weighing 21 tons.

* * *

THE L.N.E.R. have decided to proceed at once with their scheme for obtaining access to the new colliery at Blidworth. A large expenditure will be involved in the construction of a branch line a little over 2 miles long, commencing by a junction with the L.N.E.R. Rufford Colliery Branch and terminating at the Blidworth Colliery.

* * *

IMPORTANT structural alterations are to be made to Blackfriars Station, Metropolitan District Railway, including connections with the public subways adjacent. The alterations will also facilitate interchange between the District and Southern Railway stations. The booking hall will be equipped with passimeters and finished in the same style as that adopted at Westminster Station.

* * *

To meet the further demands which will be entailed when the Morden extension and other works in progress are completed, a fourth 15,000-kw. turbo-generator is on order for Lots Road power station. This will bring the generating capacity to 102,000 kw. Two new boilers are also to be added.

* * *

THE short connecting line which is to be built at King's Cross between the Piccadilly and City tube railways will be completed during the present year. This link will not be used for general traffic working, but will enable City and Hampstead line stock to be sent to the Acton overhaul depot for work at present done at Golders Green.

* * *

THE Ministry of Transport has granted an order for the construction of the Romney, Dymchurch and Hythe Light Railway. The railway is to be laid on the 15-in. gauge, and will be operated by locomotives of miniature main-line type, as in the case of the Eskdale Railway, Cumberland.

* * *

RECENTLY, a Mrs. Katharine Pollybank, living at O'Brien, Quebec Province, was presented with the Canadian Humane Society's bronze medal by Sir Henry Thornton, Chairman and President of the Canadian National Railways, by wireless communication. The medal was brought by an officer of the railway company, while Sir Henry Thornton spoke from Ottawa to Mrs. Pollybank's home, where a receiving set had been installed.

* * *

THE L.N.E.R. have let a contract amounting to £20,000 to Sir William Arrol & Co. Ltd., Glasgow, for the extension of the Hawes Pier at South Queensferry. The extension will be 240 ft. in length and 80 ft. in breadth, with a centre screen wall. The extended pier for a width of 12 ft. all round will be constructed in reinforced concrete, the remainder of the pier being filled in with stone hearthing, the surface of which will be finished in whinstone cement-grouted. Arrangements are being made to make an immediate start with the work, which will be under the supervision of Mr. W. A. Fraser, the company's engineer (Scotland).

* * *

MR. S. M. W. HANN, of "Frensham," Shirley Road, Croydon, is promoting the formation of a society to be entitled "The Transport Observation and Models Society," and would be glad to get in touch with readers in the district interested in railways, locomotives, general transport and models.

* * *

THE L.M.S.R. have ordered 5,800 wagons and 300 under-frames from British firms, in addition to 50 express passenger locomotives.

* * *

MR. N. H. BAILEY will continue his series of lectures on locomotive construction to the Manchester and District Model Railway Club at the Clarion Café, Market Street, Manchester, at 7.30 p.m. on April 13.

* * *

THE general offices of the Commonwealth Steel Company, of St. Louis, U.S.A., have been transferred to their new office building at the plant in Granite City, Ill. All communications should hereafter be addressed: Commonwealth Steel Company, Granite City, Illinois.

* * *

THE Wimbledon and District Model Railway Club will have a lecture on April 12, on the "O O" gauge, by Mr. A. S. Reidpath, of Messrs. Marshall-Stewart & Co. On April 24, the members are visiting Lots Road Power Station, Chelsea.

* * *

THE Cape Town correspondent of the *Daily Mail*, commenting upon the recent accelerations of South African express trains, recently gave the following particulars, comparing their times with corresponding runs in Australia and Canada, as follows: Johannesburg to Cape Town, 956 miles (miles per hour, including stops, 33¾); Cape Town to

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Durban, 1,253 miles (27 m.p.h.); Sydney to Melbourne, 592 miles (33¾ m.p.h.); Melbourne to Adelaide, 492 miles (27½ m.p.h.); Montreal to Toronto, 340 miles (38 m.p.h.); Ottawa to Winnipeg, 1,256 miles (29¼ m.p.h.).

* * *

THE L.N.E.R. has placed an order with Earle's Shipbuilding & Engineering Co. Ltd., Hull, for a new cargo steamer for service between Harwich and the Continent. She will be a cruiser stern vessel, length b.p., 255 ft.; breadth, 36 ft.; loaded draught, 17 ft. 8 in.; having a cargo capacity of about 92,000 cubic ft. Single-screw reciprocating engines, about 2,300 h.p.; service speed 14 knots.

* * *

A CONTRACT has been placed by the L.M.S.R. with the Vulcan Foundry Limited, of Newton-le-Willows, for 50 three-cylinder 4-4-0 type compound express locomotives, for service on various sections of the main lines. This order follows upon a previous one for 25 engines of the same class, which was completed last year by the Vulcan Foundry Limited for the same railway company.

* * *

THE L.N.E.R. have authorised the necessary expenditure for providing two additional sidings, with cart access, in the March goods yard, for dealing with the increased traffic; also at Edgware, where considerable building developments are taking place. The work is being taken in hand forthwith in each case.

* * *

AN exhibition of work by members of the Model Railway Club will be held in the Kingsway Hall, Kingsway, London, W.C. 1, on Thursday, April 15, from 2 p.m., and on Friday and Saturday, April 16-17, from 10 a.m. to 10 p.m.; admission, adults 1s. 2d., children 6d. The Hon. Secretary, Mr. R. Henvey, of White Cottage, Shirley, near Croydon, Surrey, will be pleased to supply further information, as also in regard to an open competition for No. 1 gauge (1¾ in.) steam locomotives.

A METROPOLITAN RAILWAY SPRING SHOPPING POSTER.

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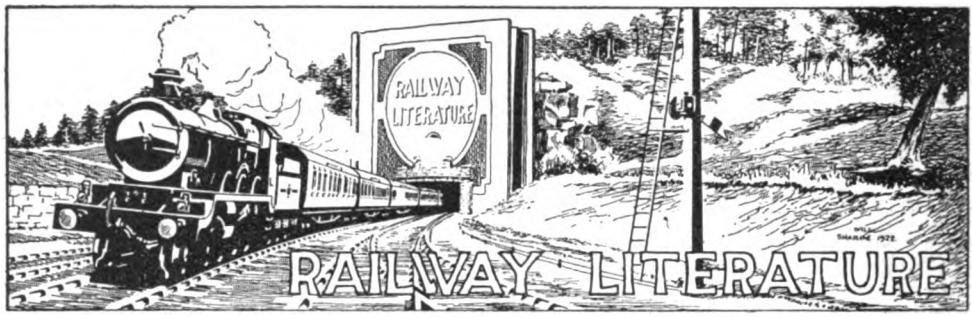

HOLIDAY HAUNTS, 1926 Edition. Published by the Great Western Railway, Paddington, W. Price 6d.

With a forethought for the 1926 holiday season that is commendable, the edition for the current year of the Great Western Railway's *Holiday Haunts* was available in February. The well-written descriptive matter is arranged under the various counties, London & Channel Islands, with an additional section for Southern Ireland. The sub-arrangement under each heading gives the local information—the place-names being in alphabetical order. The growth of this useful guide to holiday resorts has been truly remarkable. When *Holiday Haunts* made its first appearance, in 1906, within its covers were included 338 pages, 3 maps and 62 illustrations. Year by year, the scope of the Guide has been widened and the 1926 edition has 910 pages, 10 maps and nearly 400 illustrations. These photographic reproductions are beautiful pictures, splendidly printed on good paper.

A useful feature is the binding in each copy of a postcard, addressed to the Superintendent of the Line, G.W.R., asking for information as to trains, fares, &c., between the enquirer's home station and the particular "holiday haunt" he or she desires to visit. The new edition consists of 175,000 copies, but in view of the increasing crowds that yearly go "Great Western" for a holiday, early application is advised, if our readers desire a copy.

BRITISH Evertite Locknuts Limited, St. Margaret's Mansions, 57 and 59, Victoria Street, Westminster, London, S.W.1, send specimens of the new design of locknut which they are placing on the market. The special feature is that, after the nut has been screwed, a V-groove is turned internally, so placed with reference to a bevelled face at one end that pressure upon the bevelled end causes sufficient distortion to realise the required locking effect without the use of any other device. These locknuts are stated to be particularly suitable for use on railway permanent way fastenings, as also for applications of a more general engineering character, particularly as the simplicity of construction and the absence of any other locking device enables them to be produced cheaply and in large numbers. These locknuts are made in various sizes, ranging from $\frac{3}{8}$ in. upwards.

THE Darlington Fencing Co. Ltd. whose London office is at Hopetoun House, 5, Lloyd's Avenue, E.C.3, send a booklet entitled "Ware Wire," describing the utilisation of an alloy more rust-resisting than spelter, and which can be applied to woven-wire fencing fabric after manufacture. They also send a price-list showing various applications.

THE Ernest Sinclair Hoist & Trolley Company, of 14, Brompton Road, London S.W.1, send a series of illustrated leaflets describing various types of wheels suitable for trolleys, light railway material, portable hoists and lifting appliances, together with others of their specialities.

NALDER Bros. & Thompson Limited, of 97A, Dalston Lane, London, E.8, send particulars of the Turner Steam Turbo-Alternator Efficiency Indicator, recently installed at the Southampton Electricity Works.

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Under this heading will be inserted short references to news items relating to locomotive engines and their duties. It must be understood, however, that information as to the stations of particular engines cannot be given, for the reason that, before the date of publication, transfers may have taken place, while lists of engines, &c., debarred from "The Why and the Wherefore" section, cannot be included under this heading. With this understanding, notes as to matters thought to be of general interest will be welcomed.

L.M.S.R.

Bournemouth expresses from the north are usually worked to Bath by class 2 4-4-0's, and are taken out again by S. & D.J.R. 4P2b 4-4-0's, and *vice versa*. The other trains on the Bristol and Mangotsfield to Bath sections are generally worked by 0-4-4T's, and occasionally by 2-4-0's. Class 3 0-6-0's are also seen, but more frequently locomotives of the smaller class.—[R. A. ATTHILL.]

"Claughton" 4-6-0 type engine No. 1893 was recently seen working the 10.47 a.m. Derby to London train *via* Nottingham, and the 2.25 p.m. ex St. Pancras return working. There are now two rebuilt 2-4-0 engines at Bedford, Midland, shed, as No. 288 has recently come from the shops and is fitted with Ross "Pop" valves. The previous rebuild has the type of safety valve formerly fitted on Midland express locomotives.—[W. T. THORNEWELL.]

No. 1105, of Leicester shed, is one of the latest 4-4-0 compounds at work on the Midland section. L.N.W. "Prince of Wales" class 4-6-0 No. 974 *Hampden* fitted with Belpaire boiler has gone to Bradford, L. & Y., shed.—[A. P. HERBERT.]

The Crewe-built 0-6-0's now run up to No. 4165, of which the last nine, from No. 4157, are Midland division engines. Ten 4-6-0 "Experiment" class locomotives are being rebuilt with non-superheated Belpaire boilers, including No. 2630 *Buffalo*. Two further 0-6-2T coal engines, Nos. 692 and 2355, have been adapted for motor service. The *ex* Knott End Railway 0-6-0T *Jubilee Queen* is in the shops at Crewe, and may be scrapped.—[F. INGHAM.]

Latest "Prince of Wales" class locomotives working on the L. & Y. section into Victoria, Manchester, include Nos. 136 *Minerva*, 362 *Robert Southey*, and 5777. New L.M.S. compounds, Nos. 1110 and 1130, are stabled at Chester, and frequently work on Manchester trains, being the first two of this class to work into Manchester Exchange. Others of the same class now on these duties are Nos. 1111 and 1113 from L.N.W. shed No. 19. No. 1132 of the same class was noted at Victoria station, Manchester, but is stationed at Crewe (15) shed. Recently an old Midland 2-4-0, No. 241, was observed piloting an L. & Y. 0-6-0 on an up goods out of Manchester.—["SCORPION" and "SHAP."]

The Western division appears to be adopting a new type of renumbering recently. Instead of the large figures on the tender, bunker, or cab sides, the old number-plates have been removed, and on the space left the new numbers have been painted in small yellow figures. Among engines so noted were "Claughton" No. 5006, "Precursor" tank No. 6822. (This is explained by Mr. C. Williams on page 334.)—["DAGMAR."]

Locomotives of the L.N.W. section are appearing with their power classification numbers on the top of the cab sides on a level with the spectacles. Among such engines are No. 2300 *Hotspur*, and "Experiment" class No. 2621 *Ethelred*, which work the Windermere and Manchester expresses. "George the Fifth" class No. 5403 *Leamington Spa*, in the new livery, is kept very spick and span, and runs on the Manchester and Llandudno club train.—["L.N.W.R.—THE BEST WAY."]

The following L.N.W. locomotives have recently worked through from Carlisle to Carnforth, *via* Whitehaven, on passenger trains:—"Precursors" Nos. 229 *Stork*, 802 *Gaelic*, 1011 *Locke*; Renowns" Nos. 1911 *Centurion*, 1917 *Inflexible*; "Experiment" No. 2643 *Bacchus* and "Prince of Wales" Nos. 391 and 487. Other L.N.W. locomotives noted on the Furness section are 4-6-0's Nos. 90 *Kestrel* and 2396 *Queen of the*

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Belgians; and 4-4-0 No. 638 *Huskisson*. Midland 2-4-0's Nos. 210 and 213 have been seen in charge of passenger trains on this section, and Midland 0-6-0's Nos. 2928, 3410 and 3737 have been working goods trains between Ulverston and Carnforth. Midland class 3 0-6-0's work regularly on the Furness line between Carnforth and Barrow, and on the Kendal branch. Leeds engines, which work the coal train from Stourton to Barrow, before returning are worked by a Barrow crew to Eskmeals. The Lakeside branch is shared by 0-6-2T's and 4-4-2T's. Another L. & Y. class 27 0-6-0, now L.M.S. No. 12181, has been turned out from Barrow shops after general repair, and others are receiving attention. Three old N.S.R. 0-6-0's are engaged on shunting duties at Barrow. G. & S.W. 0-6-0 No. 84 has returned to the Furness section and was recently noted hauling a heavy goods train banked by 0-6-2T No. 11635 and a 4-4-0 locomotive which was working to Ulverston to pick up a local passenger train. 0-6-0 No. 17630 has been observed hauling a coal train over this section, banked by 0-6-2T No. 11631.—[FURNESSIAN and G. W. KEEN.]

Caledonian section small 4-4-0 No. 14114 with tender cab is working locally between Larbert, L.M.S.R., and Alloa, L.N.E.R.—[G. W. SPINK.]

Some further 4-4-0 compounds of Midland design have recently been put into service on the L.N.W. section, as follows:—Nos. 1111–14 *ex* Derby Works and Nos. 1128–34 *ex* Horwich Works. New 0-6-0 superheater goods engines *ex* Crewe Works are in traffic up to No. 4156. The next twenty, Nos. 4157–76, are for service on the Midland Division, and of these the first ten have already been despatched to Derby. Nos. 2624 *Saracen*, and 2630 *Buffalo*—both of the 4-6-0 "Experiment" class—have been rebuilt with Belpaire boilers having "Pop" safety valves. No. 2624 has also been provided with a superheater, and is the first engine of its class (apart from No. 1361) to be so fitted. Two additional class "B" compounds have been converted to class "G1" (superheater), Nos. 405 and 1225. Other conversions to the same type are class "D" simple No. 2532, and class "G" simple No. 2656. The following 4-ft. 3-in. side tank coal engines have been adapted for working motor trains:—Nos. 692, 2355 and 3119. Engines recently turned out at Crewe painted black and lettered L.M.S., include the following, which are also renumbered as shown:—Class "G1": Nos. 843 (8906), 2054 (9320), 2088 (9274), 2225 (9188), 2250 (9294), 2272 (9360); 19-in. Goods; Nos. 1707 (8797), 2111 (8768); 18-in. Goods No. 51 (8515). In addition, quite a large number of engines—both passenger and goods—have had their number plates removed owing to the presence of Midland type compounds bearing similar numbers. In all such cases, the new L.M.S. number has been affixed in small yellow figures on the same ground. The engines concerned include "Claughton" class Nos. 1131, 1159 and 1161, these being now L.M.S. Nos. 5912, 5906 and 5901 respectively. Engines recently broken up at Crewe include two more 6-ft. 6-in. Jumbos, viz., Nos. 193 *Rocket* and 1518 *Countess*. Other withdrawals are as follows:—Nos. 521, 1440 and 1441 (4-ft. 6-in. passenger tanks); Nos. 2841 and 2869 (5-ft. 5-in. N.L.R. passenger tanks); Nos. 3254, 3337, 3404 and 3567 (4-ft. 3-in. special tanks), and No. 3127 (special D.X. goods). There are now only 27 4-2-2 singles, all Midland Division engines, as follows:—Nos. 600, 628, 632, 633, 638, 640, 641, 644, 645, 649, 651, 660, 662–5, 669–73, 677–80, 682 and 683. —[G. WILLIAMS.]

L.N.E.R.

R.O.D. type 2-8-0's noted in the Ardsley and Bradford G.N. district, include Nos. 6203, 6272, 6274, and 6358, also a G.C. 0-8-0, No. 5144 and a 0-6-2T. No. 5772. N.E. P1. 0-6-0 No. 1999 has been noted on the G.N. section, and G.N. 0-6-0T. No. 3239 has been sent to Leeds (Neville Hill) shed for trial purposes. Some new 0-6-0T.'s, including Nos. 516 and 574 are stationed at this shed. G.C. 4-6-0 No. 6102 has been transferred from Peterborough to Bradford, and has been noted working the 11.20 a.m. Pullman car express out of Bradford Exchange. Similar engines stationed at Leeds (Copley Hill) include Nos. 6097, 6098, 6101 and 6103. These engines take turns with the G.C. 4-cylinder 4-6-0's of the "Lord Farringdon" type in hauling trains between Leeds and Doncaster. New G.C. type 4-6-2T No. 1719 was recently transferred from Leeds shed to Starbeck, but has now been returned to Leeds. No. 1766 of the same class has been sent to York. N.E. "Tennant" class 2-4-0 No. 1463 mentioned in the February issue is working from Starbeck shed. The Leeds and Bradford Pullman is now worked on alternate days by G.N. "Atlantics."—[A. P. HERBERT.]

No. 988, the last of the Stephenson series of 0-6-0T's, class N7, has been noted at Liverpool Street. Ivatt "Atlantic" No. 4447 has been adapted to work over the N.B. section. Darlington built 2-6-0's Nos. 203, 207, 208 and 231 have been noted on the G.C. section in the Manchester district. An old double-framed 4-4-0, No. 6460, is being scrapped at Gorton. A large number of double-framed 0-6-0's are to be seen on the

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Cheshire Lines. These include several numbered in the capital list (*e.g.*, Nos. 5492 and 5493), while many bear numbers in the duplicate list. New type chimneys are now in evidence on several Pollitt 4-4-0's and some of the 2-4-2T's.—[C. K. DOUGLAS.]

Superheated 4-4-0 type locomotive No. 8819 of the G.E. section has been observed running with an extended smoke-box of large size as regards length.—[J. BELLCHAMBERS.]

G.E. section 4-4-0's Nos. 8796, 8812, 8823, 8829, 8845, 8849, and 8896 have been employed on the G.N. section.—[G. RAY and J. MIRAMS.]

The following engines have recently been seen at Neasden sheds :—Darlington Moguls, Nos. 204 and 206, ex R.O.D. 2-8-0, No. 6499. The complete list of the 50 new 0-6-2 tanks is as follows :—Gorton-built : Nos. 409, 421, 426, 456, 457, 460, 464, 471, 473, 475, 826, 827, 828, 829, 830, 832, 833, 834, 837, 838, 850, 851, 852, 853, 865, 866, 867, 868, 870 and 879. Robt. Stephenson & Co. :—907, 912, 913, 916, 918, 919, 935, 940, 941, 947, 950, 952, 964, 966, 967, 968, 970, 971, 987 and 988.—[W. G. BOYDEN.]

G.C. section 4-4-0 No. 6021 *Queen Mary*, frequently works both goods and passenger traffic between Lincoln and Grimsby and Cleethorpes. G.N. section 4-4-2 No. 3271 is working passenger trains between Sheffield and Cleethorpes. Several G.C. 2-cylinder 4-6-0's, built 1904, have now received new boilers, altered chimneys and domes, and new cabs. A number of G.N. "Atlantics," including Nos. 4408, 4409, 4417, 4421, 4429, 4443 and 3282, are now working over the East Lincoln section. These engines work the mineral trains as well as express passenger. G.N. 2-6-0's Nos. 4002 and 4003 are taking turns on the London fish trains. G.N. Ivatt 0-6-0's Nos. 3014 and 3015 and small "Atlantic," No. 3988 are at Boston. Old G.N. 0-6-0's Nos. 4032, 3727, and 4145 have also been working into Grimsby.—[J. D. ROBINSON.]

Named 0-6-0 goods locomotives seen at Alloa recently were Nos. 9661 *Ole Bill*, and 628B *Byng*.—[G. W. SPINK.]

G.W.R.

Tank engines are now leaving the shops with the number between the buffers at the trailing end. 2-6-2T No. 4509 has been treated in this manner. 2-4-0's are being used extensively in the Bristol district for branch and semi-fast main-line trains. The following have been noted :—Nos. 3207, 3211, 3212, 3223, 3232, 3242 and 3244. Old G.W. 0-4-2T's and 2-4-0T's have carried their numbers on the side tanks until recently, but when repainted they now have "Great Western" on the tanks and the numbers on the cab or bunker sides.—[R. A. ATTHILL.]

"Castle" class 4-6-0 locomotive No. 4089, *Donnington Castle* has lately been stationed at Wolverhampton, and has been working the Birkenhead to Bournemouth express between Wolverhampton and Oxford, continuing thence to London for the 6.10 p.m. Paddington to Birkenhead train, by which she returns as far as Wolverhampton. Owing to this engine breaking a coupling rod near West Bromwich on January 28, however, she is now replaced by "Star" class No. 4058, *Princess Augusta*. This working was formerly taken by "Castle" class No. 4016, *Knight of the Golden Fleece*. No. 4087, *Cardigan Castle*, has been noted working into Wolverhampton on the 2.10 *ex* Paddington Cambrian express.—[A. D. F.]

4-4-0 No. 3438 is among the G.W. locomotives employed on trains between Chester and Manchester.—["SHAP."]

Another of the "Duke" class has found her way northwards. This is No. 3288, *Mendip*, noted at work on the M.S.W.J.R. last summer, and recently seen in Crewe on a Shrewesbury local train.—[DAGMAR.]

S.R.

S.E.C.R. rebuilt 4-4-0 locomotives Nos. 179 and 507, late of the Boat Train Services, are now stationed at Hastings. Besides working Hastings-London trains, they frequently work trains over the Coast Line to Brighton. The Ashford and Brighton through train service commenced with the formation of the "Southern," and the number of such through trains has rapidly grown. Trains run *via* Hastings and Lewes, but no change of engines is occasioned thereby. The classes of locomotives used on this service are "B" Section "Grasshopper" 4-4-0's from St. Leonards Marina Shed, "B" Section "Gladstone" 0-4-2's from St. Leonards and Brighton Sheds, and "A" Section 4-4-0 Stirling rebuilds from Ashford Shed. The latest "B" Section Stroudley "Gladstone" 0-4-2's to appear in green livery are Nos. 184 (late *Stroudley*) and 187.

Further Western section locomotives working on Eastern section include 4-4-0's Nos. 148E, 384E, 424E, 426E, and 430E. 4-4-2T No. 598B of Mr. Marsh's I[1] class has been rebuilt with larger boiler, and altered cab, similarly to No. 596B. Both these engines have been working on the London Bridge and Horsham service *via* Streatham and Sutton. It is stated that the ten remaining I[1] 4-4-2T's are to be rebuilt. Drummond 0-4-4T No. 481E, fitted for auto-train working, has been seen working ordinary trains on the Ludgate Hill and Wimbledon service.—[G. T. MOODY.]

Latest Western section locomotives to be superheated include 4-4-0's Nos. 285, 288,

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725 and 728. Nos. 396, 420, 427 and 721 have snifting valves. Adams 4-4-0 No. 680 and 0-4-2 No. 652 now have Drummond boilers. No. 184 is now No. W27. Adams 4-4-0's Nos. 0162 and 0447, together with Beattie 0-6-0's Nos. 0311, 0347 and 0369, have been withdrawn. 4-4-0 No. 122 and 0-6-0's Nos. 327, 690 and 693 are being fitted with superheaters.—[TINTAGEL.]

2-6-4T No. A790, *River Avon*, was recently seen hauling a down train of 12 coaches (empty) through Surbiton, route code "Waterloo to Southampton Docks." The Urie locomotives of the "King Arthur" class Nos. 736-755 are being fitted with "Maunsell" chimneys. No. 755 has been running for some months with an experimental chimney with side louvres. Both Nos. 469 and 470, large Drummond 4-4-0's, the former with a Urie boiler, are now fitted with snifting valves and six-wheeled tenders for working Waterloo-Portsmouth expresses. No. 466 also has snifting valves and a six-wheel tender. N.S.L. excursions to Bournemouth and Portsmouth are hauled by "King Arthur" class locomotives.—[R. S. JOHN and TINTAGEL.]

S. & D.J.R.

Six new large passenger engines are to be built for the heavy summer traffic. Heavy goods trains from the Radstock district collieries and Chilcompton quarries, usually hauled by 2-8-0's, are banked to Masbury by 0-6-0 saddle tanks or 0-6-0's. The banking engines return light, while the 2-8-0's work back on the evening empties.—[R. A. ATTHILL.]

Irish Railways.

The list of new numbers for the D. & S.E. locomotives, published in these columns in the February issue, does not include 2-4-0T No. 44. This locomotive has recently received heavy repairs at Dundalk (G.N. of I.R.) and regularly works from Grand Canal Street. G.S. & W. 0-6-0 locomotives are by no means the first six-coupled tender engines to negotiate the sharp curve to Carlisle Pier. On several occasions D. & S.E. 0-6-0 and 2-4-0 locomotives have been noted on the boat trains, as circumstances may arise, but the practice of employing tender engines to the Pier is not general, and they are only used when tank engines are unavailable. The only occasions on which M.G.W. 0-6-0T's worked the Pier mail trains were on Sundays, when the load was light, as, owing to their unsuitability for passenger trains and their great age, they could not be expected to haul these trains efficiently on week days. 0-4-4T No. 279 has been working on the D. & S.E. section for some few weeks, and has replaced No. 47. The latest D. & S.E. engine to reappear is No. 54, now numbered 459.—[J. J. KENNEDY and G. A. WIGHAM.]

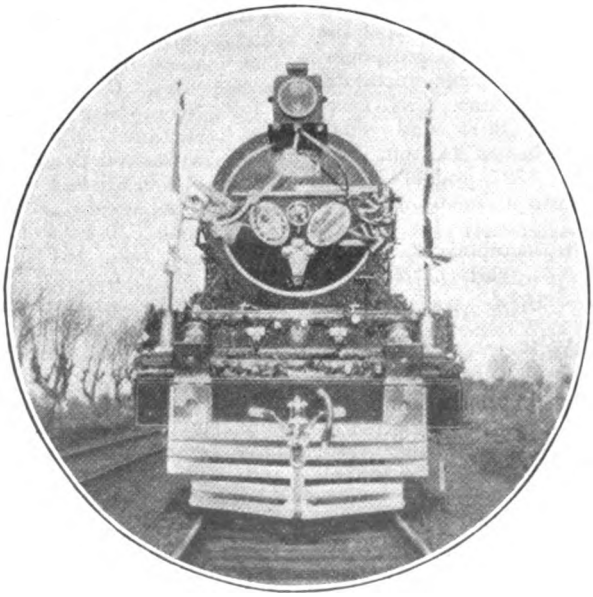

Photo.] [*H. R. Stones.*

DECORATED LOCOMOTIVE, CENTRAL ARGENTINE RAILWAY

(*See* RAILWAY MAGAZINE, *December*, 1925, *page* 510.)

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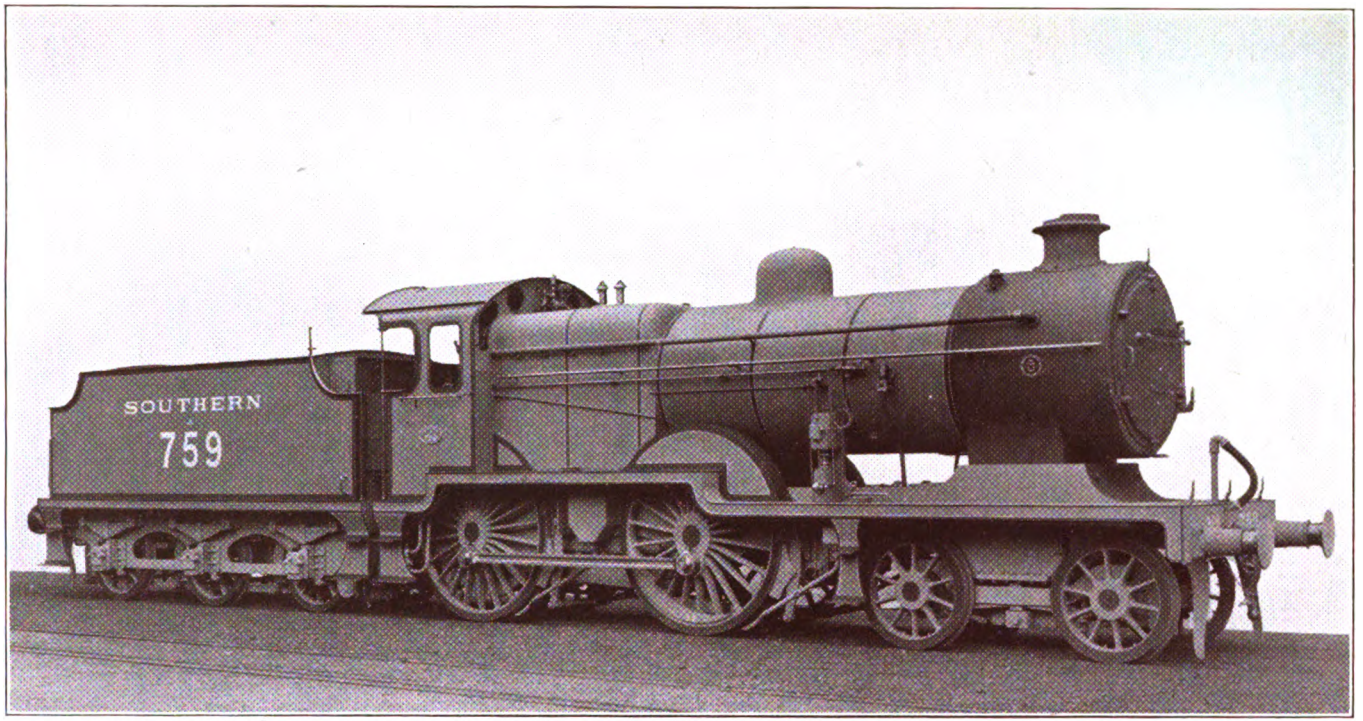

THE RAILWAY MAGAZINE.]

NEW 4-4-0 EXPRESS LOCOMOTIVE, SOUTHERN RAILWAY.

Mr. R. E. L. Maunsell, C.B.E., Chief Mechanical Engineer.

Cylinders, 19½ in. × 26 in.
Heating Surface, 1407 sq. ft.

Coupled Wheels, 6 ft. 8 in. diam.
Superheater Surface, 235 sq. ft.
Weight of Engine and Tender in Working Order, 99 tons.

Steam Pressure, 180 lbs. per sq. in.
Grate Area, 22·5 sq. ft.

(For description see page 381.)

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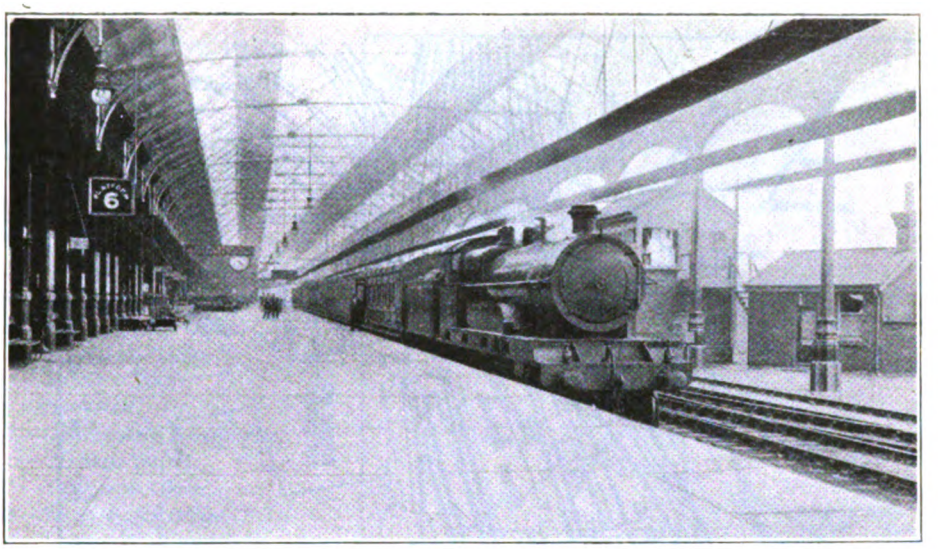

Photo.] [*H. Gordon Tidey.*

UP WEST COAST EXPRESS AT No. 6 PLATFORM.

Notable Railway Stations and their Traffic.

PRESTON, L.M.S.R.

By J. F. GAIRNS, M.Inst.T., M.I.Loco.E.

UNTIL quite recently it was necessary to use the word "joint" in referring to Preston station, in that, until the London and North Western and Lancashire and Yorkshire Railways joined forces, before both became incorporated into the London Midland and Scottish system, this station was joint London and North Western and Lancashire and Yorkshire property. Even this required a slight modification—though such a description was correct for all ordinary purposes—as it was more particularly that portion of the station known as the North Union which was actually joint, while the platforms on the eastern side, used by trains approaching Preston *via* Preston Junction and known as the East Lancashire or Butler Street station, constituted Lancashire and Yorkshire property only. Grouping has, however, removed all these complicating factors, so that now Preston ranks as one of the great railway centres of the L.M.S. system, without special qualification. From the traffic point of view Preston retains all of its old importance, besides involving attention to many interesting aspects of traffic operation on the L.M.S.R., for which reason it claims a leading place in the now lengthy series of articles on "Notable Railway Stations" published in the pages of THE RAILWAY MAGAZINE.

It is necessary at this stage to point out that Preston, as a joint station, has already been dealt with in our pages, in that the February, 1903, number included a "Notable Railway Station" article thereon, by the late Rev. J. T. Lawrence, M.A. The station then described, however, was considerably smaller than that of to-day, as, although Mr. Lawrence made reference to the new platforms then under construction, they were not brought into regular use until later in 1903, so that his article dealt with train working at Preston under the conditions which then applied. Even at that time the station was one of considerable size, as there were seven through platform lines and four terminal bays.

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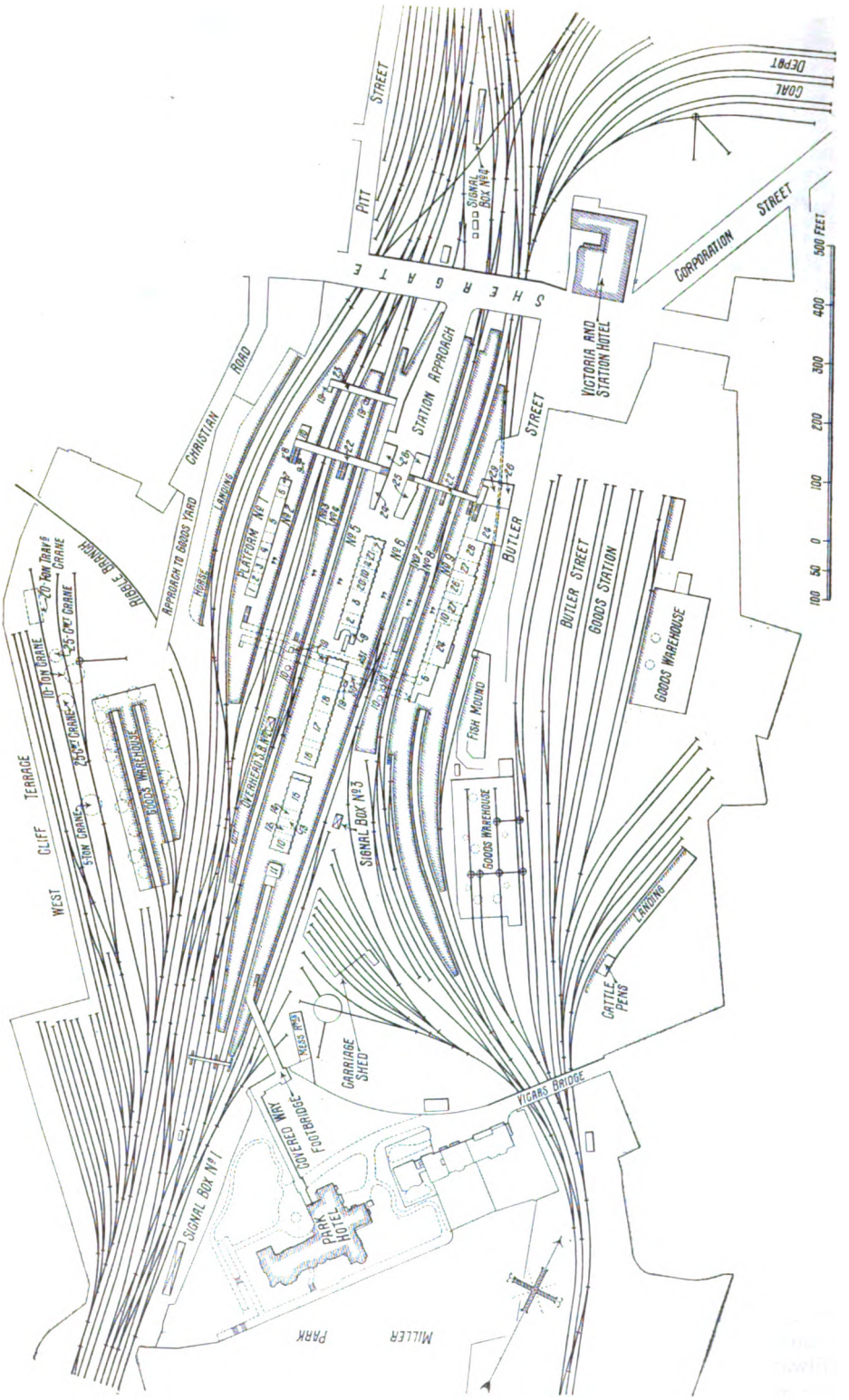

PLAN OF PRESTON STATION, L.M.S.R. (*For references see opposite page.*)

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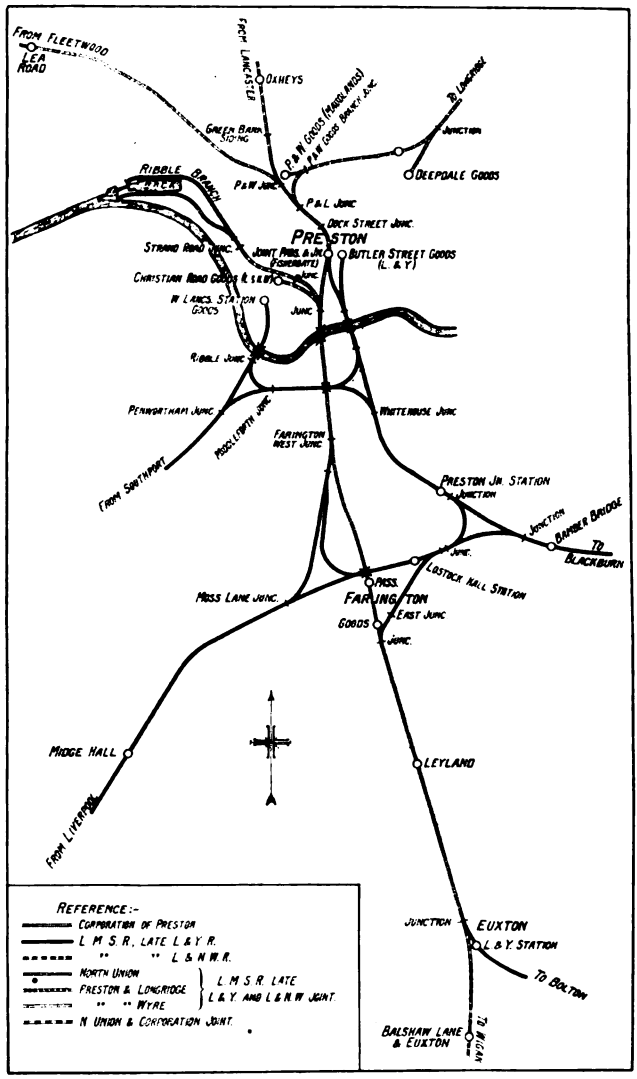
REFERENCES FOR PLAN ON OPPOSITE PAGE.

1.—Gentlemen's Waiting Room.
2.—Ladies' Waiting Room, First-Class.
3.—Ladies' Waiting Room, Third-Class.
4.—General Waiting Room.
5.—Refreshment Rooms.
6.—Left Luggage Office.
7.—Inspectors' Office.
8.—Tobacco Stall.
9.—Bookstall.
10.—Gentlemen's Lavatories.
11.—Carriage Stores.
12.—Telegraph Office.
13.—Re-Booking Office.
14.—Ladies' Waiting Room.
15.—Post Office Room.
16.—Refreshment Room, Third-Class.
17.—Refreshment Room, First-Class.
18.—Dining Room.
19.—Lift.
20.—Gentlemen's Waiting Room, First-Class.
21.—Stationmaster's Office.
22.—Footbridge.
23.—Luggage Bridge.
24.—Parcel Office.
25.—Cloak Room.
26.—Booking Office.
27.—Waiting Rooms.
28.—Telegraph Office, Stationmaster's Office, and Guards' and Porters' Rooms.
29.—Booking Hall.
30.—Subway for Luggage.
31.—Subway for Passengers.



MAP SHOWING RAIL CONNECTIONS, INDICATING ALSO PRE-GROUPING OWNERSHIP.

Now the station has 13 platform faces, four of which are sufficiently long to take two trains simultaneously, if required. The basis of the present station, those portions described by Mr. Lawrence, date from 1880.

In order to appreciate the traffic importance and the characteristics of the traffic there handled, it will be advisable first to describe the general lay-out of the railways in the vicinity, with reference to the sketch plan reproduced above. It will be seen that the North Union Line (previously L. & Y. and L. & N.W. Joint), which constitutes part of what used to be regarded as the London and North Western main line to the north, commences at Euxton Junction, at the point where the L. & N.W. line from Wigan and the L. & Y. line from Bolton join. This is four-track from Euxton Junction through to the junctions north of Preston station, with, of course, increased numbers of tracks through the Preston station area. At Farington Junction a branch is put off to connect with the L. & Y. line from

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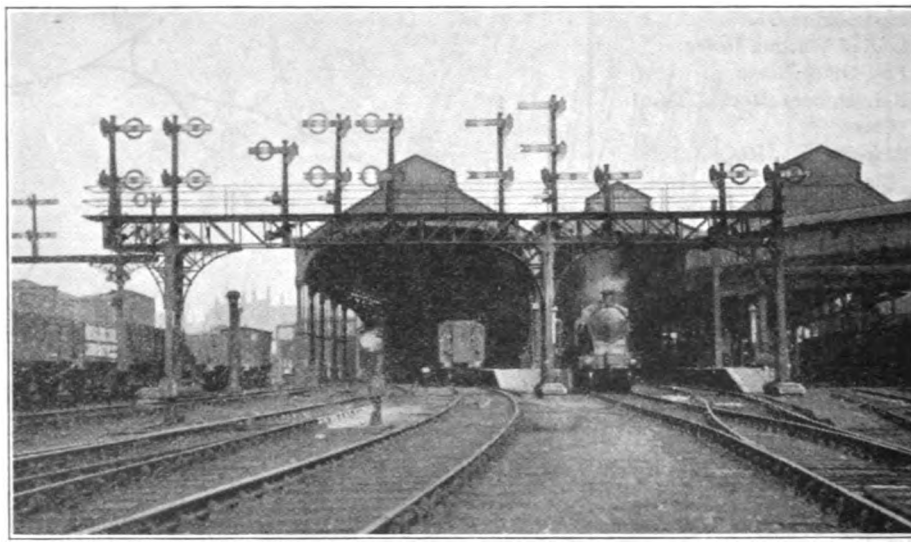
Liverpool (which crosses the North Union line just north of Farington station) at Lostock Hall Junction, and at Preston and Bamber Bridge Junctions with the L. & Y. line from Blackburn. These three junctions control a triangle, so that trains from Liverpool by the L. & Y. route can be sent across to Blackburn and beyond without touching the North Union line from Preston station, while the connections at Lostock Hall and Farington Junctions enable main-line trains to reach the East Lancashire or Butler Street side of Preston station independently of the main line. To the east of the North Union line a further triangle is available, controlled by Moss Lane and Farington Curve Junction boxes, so that trains from Liverpool can also reach the main North Union line. Just before crossing the River Ribble, further connections are made between the L. & Y. Southport line and the East Lancashire line, two triangles being provided to enable trains from either side to reach either the West Lancashire station (now utilised for goods traffic only) or the Butler Street side of Preston main-line station, the connecting line passing under the North Union main route. Beyond the viaduct by which the River Ribble is crossed (it will be noted that three such viaducts are actually required for the respective routes) there is a short L.N.W. branch to Christian Road depot, and a North Union and Preston Corporation Joint line, known as the Ribble branch, down to Strand Road Junction, in order to obtain access to Preston Docks.

At Preston station itself the East Lancashire line, after putting off a spur into Butler Street depot immediately alongside, curves into the platforms on the eastern side of the station, also connecting with two terminal platforms on the curve used by local trains on that side. North of the station the North Union and East Lancashire lines become combined, and North Union ownership comes to an end at Dock Street Junction just beyond. Fourteen chains further on, at Preston and Longridge Junction, the Longridge branch (previously L. & Y. and L.N.W. Joint) diverges to the east. At Preston and Wyre Junction the L. & Y. and L.N.W. Preston and Wyre Joint line to Blackpool and Fleetwood diverges to the west, while the L.N.W. main line continues north to Lancaster and Carlisle. A short spur from the Longridge branch gives access to the Preston and Wyre goods depot, known as Maudlands.



SOUTH END OF PLATFORMS 5 AND 6, WITH INTERVENING BAYS

The formation of the London Midland & Scottish Railway has, of course, removed all these ownership complications, though, to a great extent, all the old traffic characteristics still apply. In many respects,

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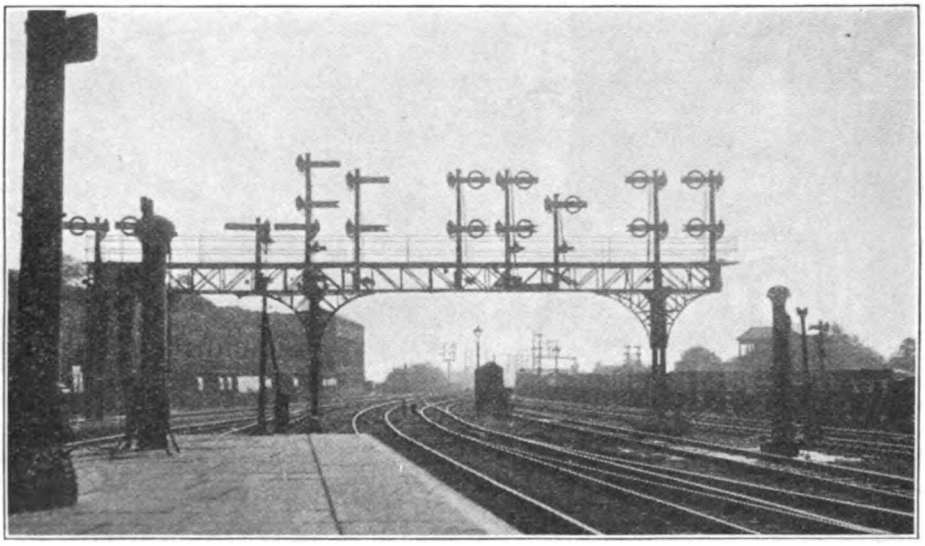
indeed, this is a necessary condition, in that, while the ownership of the railway may have been changed, the handling of traffic and the various train services concerned have been developed on the basis of requirements and public convenience, while the fact that joint interests were so largely involved meant that the arrangements as between the L. & N.W. and L. & Y. companies were largely a matter of co-operation, the competitive element being but slightly concerned.

But, although joint ownership complexities have been removed, the fact remains that Preston has to deal not only with a very heavy traffic, but with trains on a variety of services, the correlation of which may at times be a matter of some difficulty, though the layout and the number of inter-connecting and auxiliary lines immediately south of Preston enables trains to be routed more or less as convenient. Speaking generally, all L.N.W. route trains keep to the North Union line throughout, and this applies also to L. & Y. route trains travelling *via* Euxton Junction, especially from the Manchester direction. It is, however, possible to divert any of these trains, *via* Lostock Hall and Preston Junctions, to the Butler Street side of Preston station, if necessary, but that is seldom done as that side of the station is already very fully occupied with trains from the Blackburn, Liverpool and Southport lines, utilising the various connections shown on the plan, though a few Liverpool line trains are sent *via* Moss Lane and Farington West Junctions, to the North Union side of Preston station, and, if need be, this can be done also in the case of trains in the Blackburn direction.

Bearing in mind, however, the large number of train services which centre upon Preston, it will be obvious that the practice of standardising routes and platform arrangements at Preston station must be, to a great extent, adhered to, while it is only necessary to mention the name "Blackpool"—to which Preston may be regarded as the gateway— to realise that the traffic of this favourite resort, together with its immediate neighbours and Fleetwood, would be almost sufficient, during the summer months, to keep Preston station busy, without the operation of any other traffic. The working of Blackpool traffic is, indeed, the main problem at Preston station, in that, on summer Saturdays, on public holidays and largely throughout the summer, Preston may have to pass from 50 to 100, or even more, trains, nearly all to or from Blackpool, in addition to the very full services appearing in the public time-tables. It must be remembered, too, that Preston is itself



LOOKING SOUTH FROM No. 5 TOWARDS No. 1 SIGNAL CABIN.

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a town of considerable size, with many industrial activities, while it ranks, to some extent, also as a seaport. Consequently, the town originates, or constitutes the objective of, traffic on no small scale, while the inter-connecting facilities arranged at the station account for a large volume of interchange traffic all day long, and all the year round.

The main entrance to the station is from Fishergate, a principal thoroughfare, along which electric tramcars and motor omnibuses pass. Midway of the station an approach road leads to a wide courtyard giving access to the main booking hall, from whence a wide footbridge passes east and west across the station to give access to the respective platforms. This footbridge also connects with an auxiliary booking office in Butler Street, on the east side, while at the south a footbridge leading to the Park Hotel (owned by the L.M.S.R. and previously joint L.N.W. and L. & Y. property) gives access also to a bridge known as the Vicars Bridge, by which the station can be reached. At the north end there is a luggage bridge with hoists to each platform, while further south there are two subways, one for passenger interchange and the other for luggage transfer in connection with hoists as required.

The new platforms added in 1903 are Nos. 1 and 2. These represent the two faces of a big island platform, designed generally to harmonise with the older platform between Nos. 5 and 6. Both of these have a length of some 1,200 ft., so that the four platforms concerned rank among the very long railway platforms of the country. Both Nos. 1 and 2 and Nos. 5 and 6 have three blocks of station buildings, including refreshment and dining rooms, waiting rooms, station offices, &c., on a very complete basis. It may be remembered that before dining cars were run regularly on West Coast expresses, a stop at Preston for 20 minutes for lunch or dinner was a regular feature of through journeys. It is true that it is not now necessary to provide accommodation on that scale, but the fact that these big platforms each have a complete equipment of refreshment and dining rooms indicates that a very substantial business in this direction is done, notwithstanding that so many of the expresses now include restaurant cars.

MAIN LINE TRAIN AT No. 6 PLATFORM.

Beyond No. 1 platform there are up and down through lines, over which the fairly numerous trains which do not call at Preston are directed, as far as practicable. This applies especially in regard to the Blackpool non-stop business expresses from and to Manchester, and the numerous and special trains run in summer, in that

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as the Blackpool and Fleetwood branch diverges to the west north of Preston, it is useful to pass trains through Preston on the most convenient side. Other main line expresses usually go through on one of the main platform lines, and this applies frequently to Blackpool and other trains, as found most convenient, especially at times when it is desired to work goods trains on the through lines. Beyond the up and down through lines is a loading bank, with private access to Christian Road, an adjoining thoroughfare, so that traffic handled at the loading bank does not interfere with the work of the station.

The outer passenger platform, No. 1, ranks as the main down platform for trains towards Blackpool. No. 2, the other face of the new island, is signalled for use either as an up or a down line, but it is generally utilised for up traffic. The fact that it is signalled both ways is, however, a convenience in that it is available for both arrival and departure of Longridge branch trains, and it can be utilised also for reversing trains from the north to the Blackpool line, or *vice versa*. Otherwise, it is generally used as an up line for through traffic from Blackpool towards Liverpool and Manchester, *via* the North Union line. Between No. 2 and No. 3 there is a centre line which, in conjunction with crossovers provided about midway, is handy for movements of engines running round trains, while, if need be, vehicles to be transferred from one train to another, or empty carriages in reserve, can be placed there temporarily.

Nos. 3 and 4 are on either side of a somewhat narrow platform, which existed before Nos. 1 and 2 were added. There are no platform buildings, for which reason these platforms are not generally used for important trains. No. 3, like No. 2, is signalled for movements in either direction, and may, therefore, be regarded as a traffic counterpart of No. 2. These two platforms are, in fact, often used alternatively or to facilitate interchange of through sections of trains which have to be re-marshalled at Preston. Otherwise, trains of a local character are usually dealt with on No. 3, while No. 4 ranks as a loop platform to No. 5, which is the down fast line, principally so far as L.N.W. route trains are concerned. Crossovers are provided between Nos. 4 and 5, so that re-marshalling and like operations can conveniently be carried out between trains on each.

As already mentioned, Nos. 5 and 6 embrace the older of the two big islands which constitute the principal feature of Preston station, No. 5 being the down fast and No. 6 the up fast. On these platforms there is a complete equipment of station premises. It is at these two platforms that most of the West Coast expresses are dealt with. Next comes another somewhat narrow platform, shorter than those hitherto mentioned, of which the face serving No. 7 constitutes an up loop line having the same relation to No. 6 for up traffic as No. 4 has to No. 5 for down traffic. No. 8 constitutes the East Lancashire side down line, while No. 9 is the main East Lancashire up line. On this platform, also, there is a complete range of station offices, including refreshment rooms, waiting rooms, &c., in that the East Lancashire was, until recently, regarded as a separate station. Behind the station buildings, however, there is now another platform, No. 10, constituting an alternative to No. 9. As the East Lancashire line curves to the east, there are, between Nos. 9 and 10, three terminal lines, one (No. 11) set back from No. 9, alongside No. 9's through line, and the other two (Nos. 12 and 13) in the form of terminal bays. These are generally used for trains on routes conveniently accessible on the East Lancashire side, including trains to or from Southport, connecting with the West Lancashire line *via* the Whitehouse North and West Junctions. Beyond No. 10 are a fish bank, adjacent to the Preston fish market, and a loading dock for horses, available also for handling theatrical and similar special traffic, while to the south are the Butler Street goods station warehouses and yard. To the south of the main station, in the angle between the North Union lines and the curves of the East Lancashire route, are extensive carriage sidings and accommodation for carriage cleaning and other purposes. Between Nos. 5 and 6 platforms, at the south end, two short dock lines are inlet. These are occasionally handy for dealing with short trains and for remarshalling operations, but are generally regarded as suitable mainly for loading or

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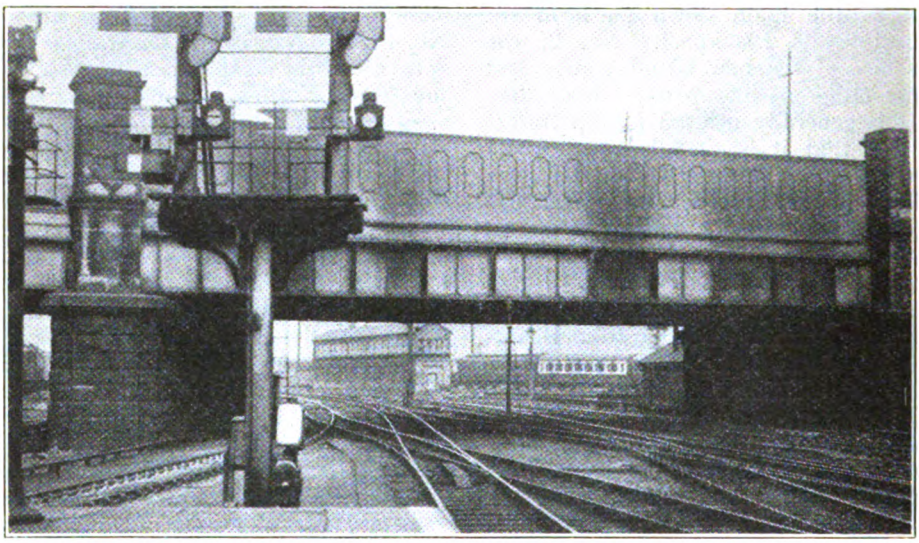
unloading vans and for standing engines for up main-line trains which change engines at Preston. Near the south end of No. 6 is a stairway leading to the footbridge by which passengers can proceed direct to the railway company's Park Hotel. This hotel is, by the way, highly esteemed by business people and travellers, and stands in beautiful grounds leading down towards the River Ribble, in somewhat striking contrast to the industrial indications so prominently in view north of Preston station. On the south, indeed, the approach to Preston is distinctly picturesque, particularly in view of the viaducts by which the River Ribble is crossed and in the neighbourhood of the Whitehouse Junctions, though the fact that the main line has already widened considerably to accommodate the goods yard and to provide siding space renders it more interesting to view the East Lancashire line from the main line than the other way round.

Goods traffic is mainly dealt with in the goods yard on the down side of the North Union line, south of the station, and it is from this yard that connection is made with the line down to Preston Docks, jointly owned with the Preston Corporation, though a certain amount of goods traffic is also handled at Maudlands, as well as at Deepdale Goods (a short spur from the Longridge line) and at Butler Street.

In view of the complexities of the Preston area, the station master has jurisdiction over quite a number of signal boxes in the immediate vicinity, including Farington Curve Junction, 27 levers; Skew Bridge, 36 levers; Ribble Sidings, 65 levers (covering access to the North Union goods yard); Preston No. 1, 138 working and 24 spare levers (controlling the south end of the main station); Preston No. 2, 39 levers (alongside the station on the down side and dealing mainly with station work); Preston No. 3 43 levers (dealing with station work on Nos. 6 and 7 or the up side of the main station); Preston No. 4, 170 working and 14 spare levers (controlling station work at the north end); Preston No. 5, 94 working and 32 spare levers (controlling the northern junctions); Maudland Viaduct, 37 working and 5 spare levers (controlling the actual junction between Blackpool and main lines); Goods Line, 45 working and 24 spare levers, and Goods Yard, 21 working and 9 spare levers; Strand Road, 6 levers (on the Preston Dock line); East Lancashire Goods Yard, 55 levers; Whitehouse North Junction 21 working and 5 spare levers; Whitehouse West Junction, 21 working and 3 spare levers; and Penwortham Junction,



LOOKING NORTH FROM No. 2 TO No. 4 SIGNAL CABIN.

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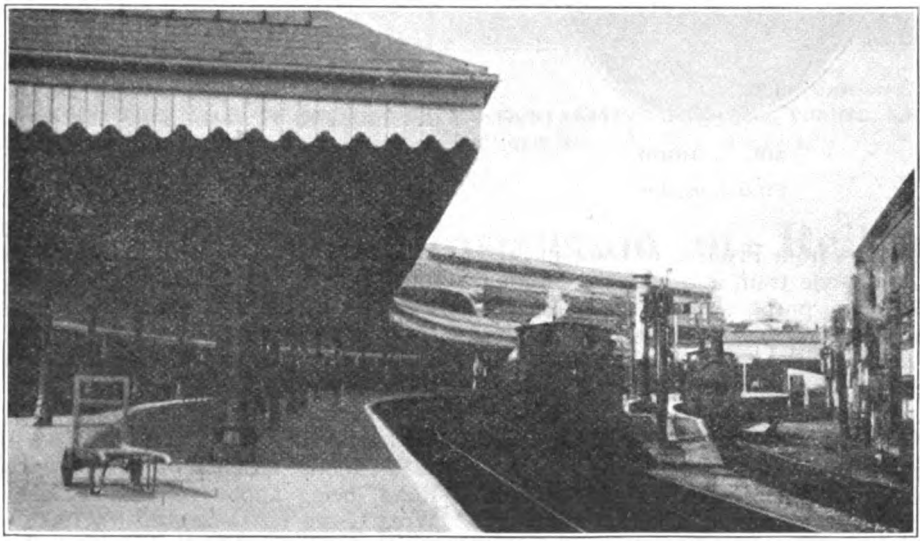
12 working and 4 spare levers. The signalling is mechanical and of ordinary pattern, but all platform lines are now equipped with track circuit or "vehicle on line" indicators. The connection from the goods yard to Preston Docks is single-track, but is quite a busy line operated under the control of electric train staff apparatus.

By the very nature of this traffic Preston is necessarily a 24-hour station, and even during the early morning hours a considerable amount of work is always being done in the handling of parcels and luggage traffic, while seasonal traffic, such as fruit, together with fish and so on, has to be dealt with. During the night hours several West Coast expresses call at Preston, while in the case of Liverpool and Manchester-Scottish expresses Preston is often made the division or combining point, both day and night. A few restaurant cars run to or from Preston, and their handling involves a degree of shunting work, and both day and night (except during hours when goods traffic is restricted in favour of the passenger trains) there is a constant succession of goods and mineral trains passing either on the up and down through lines or through one or other of the platform lines. In the neighbourhood of 1 a.m. the down postal train spends 10 minutes at Preston, while the up postal train calls for attention at 11.0 p.m.

During the summer months and at holiday periods, particularly at week-ends, several long-distance period excursion trains call at Preston, either in the later evening hours or in the early morning, while, as already mentioned, not only do the summer months and holiday periods mean tremendous numbers of booked excursion and other trains to and from Blackpool, but these are nearly always amplified by considerable numbers of excursion, relief, additional and special trains not appearing in the public timetables. Other traffic is that associated with the various special newspaper expresses, together with scheduled and special parcels trains. At times, in fact, it is quite a problem how to pass the required numbers of trains through the station without interfering with other traffic, bearing in mind that most of the West Coast expresses which call at Preston require to spend 8 to 10 minutes there, the Liverpool and Manchester-Scottish expresses needing combination or division, and even the ordinary Blackpool trains, if booked to call at Preston, involve a considerable amount of passenger interchange. There are, besides, numerous trains of a local or connecting-route character which either terminate



VIEW IN EAST LANCASHIRE STATION.

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MR. J. HOOD,
Station master.

at or start from Preston, or come in practically as one train and leave as another, their main purpose being to allow passengers to interchange between the various routes which centre upon Preston.

Taking the standard summer arrangements, it may be said that, normally, some 200 trains arrive at and about the same number depart from Preston, while approximately 50 in each direction pass without calling. As shown by the lists which are posted for the information of staff and passengers, on summer Saturdays and in connection with public holidays, this number may be added to by as many as 100 or even more trains. Speaking generally, Preston itself does not account for any exceptional traffic pressure, though occasionally the station officials have their work cut out to meet the needs of traffic peculiar to the town. Thus, in this connection, the Preston Merchant Guild festival, held every 20 years under a very old charter, accounts for perhaps the heaviest traffic, though the Easter Monday "egg-rolling" in the Park and the Whitsuntide processions—Roman Catholics in the morning and Protestants in the afternoon—and the Preston holidays held in the second week of August may be mentioned as occasions when the officials at Preston have their hands full in meeting the transport needs of their own town.

Station working at Preston has, since 1923, been under the sole direction of Mr. J. Hood, as station master, though, prior to that date, there were both North Union and East Lancashire station masters. Mr. Hood is assisted by three assistant station masters (Messrs. T. Dugdale, E. Charlston and H. Worsley), together with 9 platform inspectors, 3 main line inspectors, 5 station foremen, 5 yard foremen (traffic), 2 parcels foremen, 59 signalmen, 4 relief signalmen and 14 signal boys, 87 ordinary and parcels porters, train reporters, 25 foremen and ordinary ticket collectors, 4 train attendants, 29 guards, 22 shunters, 11 cloakroom and waiting-room attendants, and a chief clerk, a staff-clerk, 3 ordinary clerks and 2 enquiry office clerks, bringing the total to about 300 persons, with additions during the summer months. The booking and parcels offices are under the direction of Mr. R. Swarbrick, passenger agent, while Mr. G. Hales is goods agent, having charge of the Butler Street, Christian Road and main goods depots.

Mr. Hood entered the Lancashire and Yorkshire Railway service on May 8, 1893, as a goods clerk at Blackpool, Talbot Road, being appointed station master at Wrea Green on December 10, 1900, since which time he has held the following positions:—station master, Salwick (1904); station master and clerk in charge, Lytham (1908); station master, Blackpool, Waterloo Road (1912); station master, Blackpool, Talbot Road (1917); station master, Preston (1923).

In conclusion, the writer may acknowledge his indebtedness to Mr. Hood, the station master, and his Chief Clerk, Mr. Owen, who, together with other members of the staff, rendered valuable assistance in collecting material for this article, and to officials of the L.M.S.R., by whose courteous co-operation he was enabled to undertake the study of traffic working at Preston.

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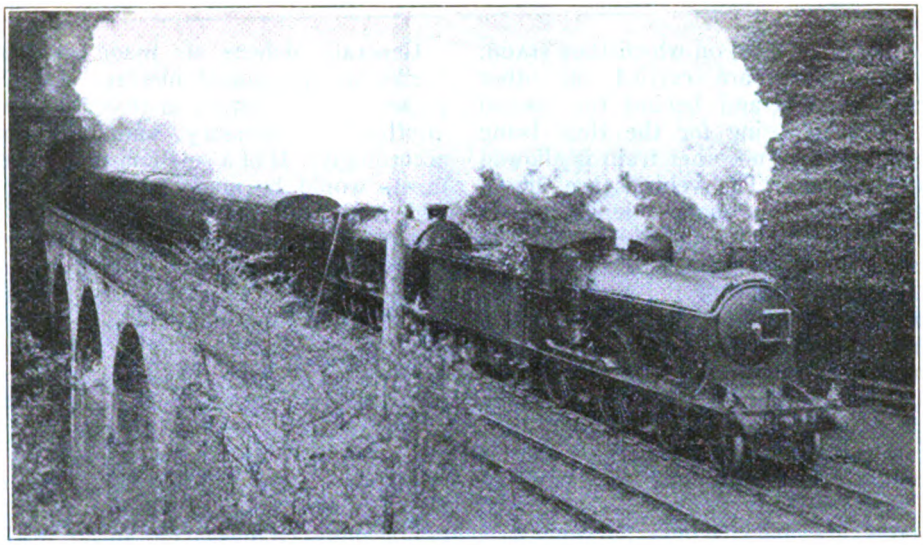

Photo] [*W. H. Cummings.*

PERTH—EDINBURGH TRAIN (WITH INVERNESS PORTION) LEAVING GLEN FARG TUNNEL, L.N.E.R.

N.B. 4-4-0's No. 418 "Dumbledykes" and No. 243 "Meg Merrilees."

Maintenance and Inspection of Railway Tunnels.

By J. R. HIND, Press Section, L.N.E.R.

TUNNELS, like all other structures, once having been built in a satisfactory way, cannot be left to look after themselves, and it is necessary to have them examined to see they are standing as constructed, and that the material of which they are built is not perishing. Special arrangements have to be made for carrying out inspections. The frequency of the inspections depends largely on the condition of the materials; what movements, if any, have occurred, and whether anything of the kind is anticipated owing to any movement in the ground through which the tunnel has been made.

Anticipated movements are generally where minerals, such as coal, are being got out in the seams which lie from quite shallow depths down to, in some mines, ½ mile below the surface of the ground, and even at these great depths the effect of settlement in the different stratas has a tendency to shake the tunnel structure. Generally, however, arrangements are made with the mine owners not to work out the coal below, and for a distance on either side of the tunnel, so as not to create disturbance, but even in these cases frequent inspections are necessary, as although the direct support may not be interfered with, the drawing away of water from the ground around the tunnel causes the ground to shrink and alters the nature of the pressures on the structure of the tunnel.

In the first place tunnels are constructed of such a size as to allow plenty of space around the engines and rolling-stock to be run on the lines through them, and the platelayers who are responsible for the maintenance of the lines of way in the tunnel are supplied with gauges which they frequently use to see the clearances are maintained. These gauges vary according to the shape of the tunnel. They are made so that when put up they fit exactly on the rails.

About every six months a gang of men go in on a specially constructed tunnel

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van with a flat roof, on which they stand. Powerful lights are carried on other trucks in front and behind the special one, the line being for the time being blocked, so that no other train is allowed in the section. The vehicles are drawn or pushed by an engine, depending on which way any smoke emitted would be carried by the current of air passing along the tunnel from the shafts or the ends. Some of the men are supplied with long-handled light hammers, others with pointed rods, and as the vehicle on which they stand moves slowly along the men tap the lining and others prod it, and they can tell whether the lining is becoming soft or loose by the sound of the hammering, &c. Any places at all defective are marked, and a note made of what has been found. This is necessary as a guide to the men who have to deal with the places afterwards, and for future reference, if of only a slight nature and not requiring early attention. Having passed right through on the one line, the vehicles are changed over to the other line, and the same examination is made over the other half of the tunnel.

Generally defects are made good with bricks laid in cement mortar. After the inspection the district engineer decides if anything is necessary, and takes steps accordingly. If of a small nature, arrangements would be made to work both up and down traffic over one line whilst the other line is occupied by the engineer's train, the men working off the tunnel van, with the lights and materials in other trucks adjacent. Should, however, it be necessary to attend to a large area of the tunnel lining, special scaffolding would be erected, clear of any carriages or loads that would pass along the lines.

The men in such a case work throughout the day, and there have been cases where double shifts have been employed, working day and night, only stopping when prevented from seeing by the smoke of trains passing underneath. Reports on the condition of all tunnels are made every six months, and where renewal, strengthening or extensive repairs are being carried out, every month, by the district engineers to the chief engineer.

EXPRESS TRAIN OPERATION IN IRELAND.

Photo.] **DUBLIN-QUEENSTOWN MAIL TRAIN AT 60 M.P.H.** [*Rex Murphy*

G. S. & W. 4-6-0 locomotive No. 403.

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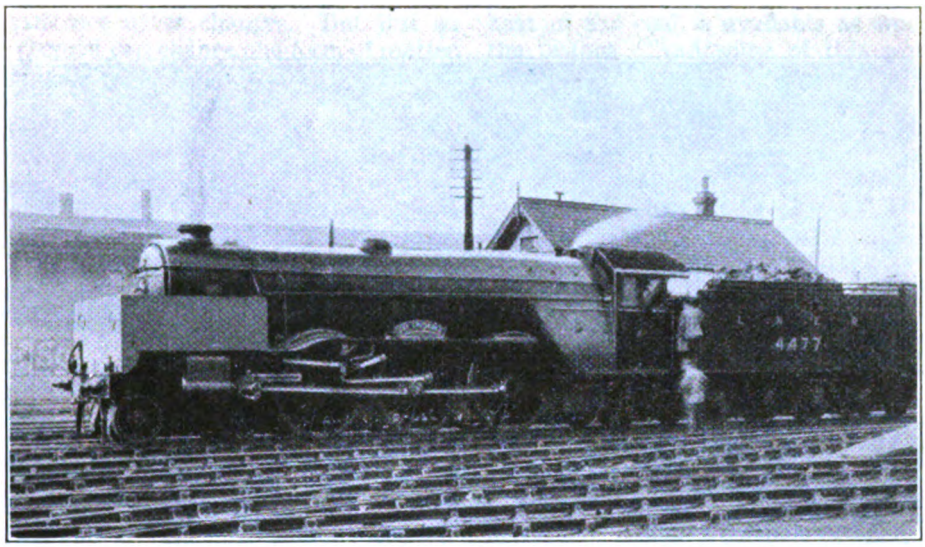

L.N.E.R. "PACIFIC" TYPE LOCOMOTIVE FITTED WITH INDICATOR SHELTER.

Testing Locomotive Engines.

By C. K. DUMAS.

THE reader has possibly occasionally seen a locomotive running with a strange-looking erection around or alongside of the smoke-box. Or he may possibly have seen one run into a station hauling, at the front of the train, a vehicle which, at first sight, appears to be a saloon, but on close inspection is found to contain an array of glittering and scientific-looking apparatus. These weird appearances are signs that a test is being carried out on the engine, and we will endeavour in the present article to give the reader some idea of the object of such tests and the method of carrying them out.

In the following pages a very complete form of engine test will be described in outline, but it must be understood that it is not always necessary to carry out the whole of the operations described. One or two only will frequently provide all the information wanted for the purpose in hand. Also special tests of various kinds not described in this article may often be made.

Before actually describing the test, a preliminary consideration of certain matters must be undertaken. This will necessarily be of a somewhat scientific nature, but an endeavour is made to cover the ground as briefly and as interestingly as possible.

It is obvious that a locomotive cannot be considered successful unless it will keep time with the trains it is designed to haul under, at any rate, all ordinary conditions of load and weather. But two locomotives of different designs may both be able to accomplish this, yet one may be decidedly better than the other, for the former may work the trains with a much less consumption of coal than the latter. Other considerations, of course, also come in, such as first cost and cost of repairs, but coal consumption is a very important factor.

The power exerted by a locomotive in hauling a train is all derived from the coal burnt in the fire-box. Students of physics are well aware that energy, like matter, though it may appear in various forms is, so far as man is concerned, uncreatable and indestructible, the sum total

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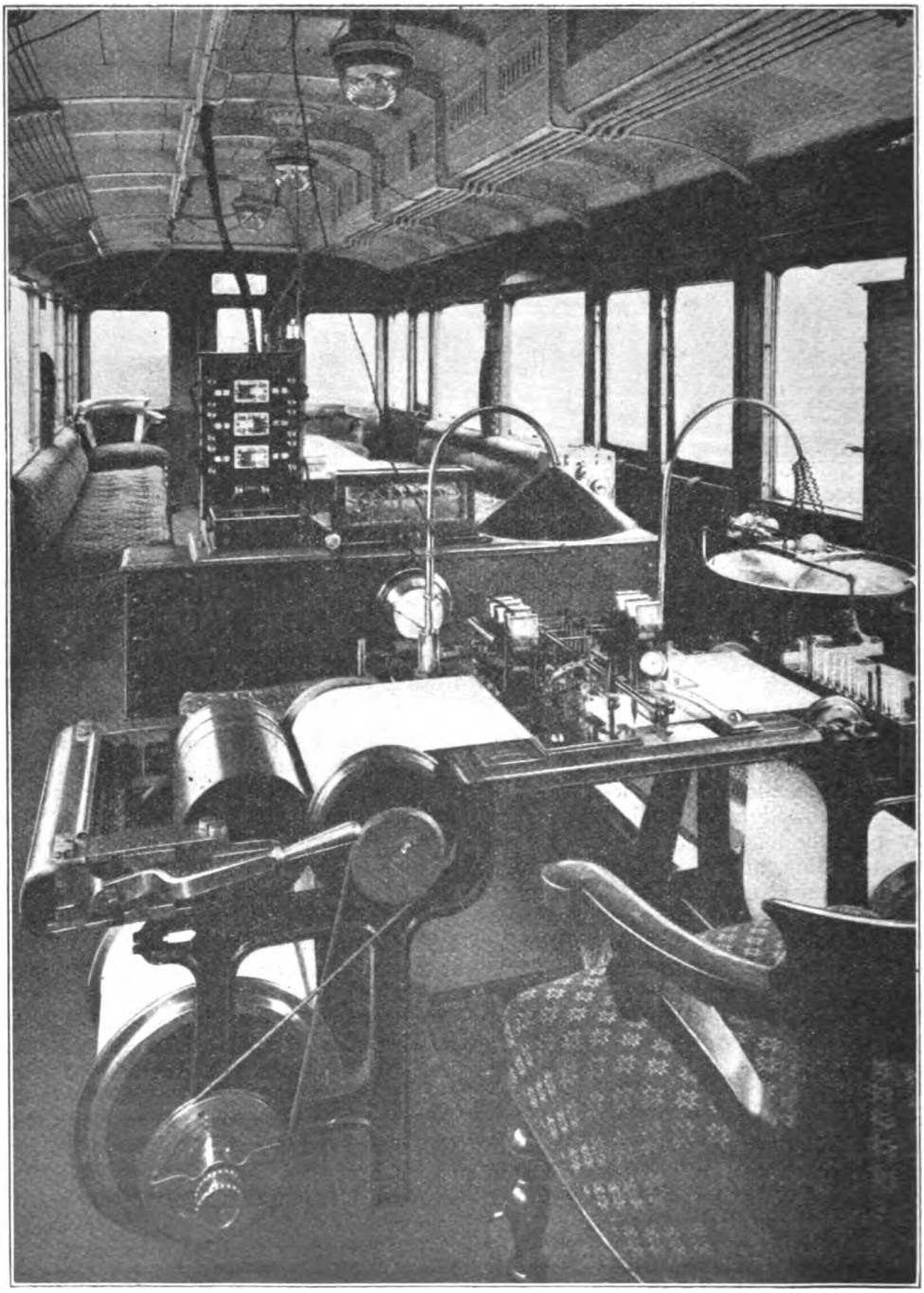

INTERIOR OF DYNAMOMETER CAR WITH APPARATUS FOR RECORDING DRAWBAR PULL AND OTHER DATA.

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in existence never changes. But just as the chemist can change one form of matter into others, so the engineer can change one form of energy into another.

A steam locomotive is a machine for converting energy in the form of heat into energy in the form of matter in motion or, as it is usually expressed, converting heat into work. The ideal state of things would be for the whole of the heat locked up, as it were, in the coal, to appear as work at the tender draw-bar but, unfortunately, this is far from being the case in practice. Only a very small proportion, about 5 per cent., is so available, and it is the aim of the locomotive designer to make this amount as large as possible. It is obvious that he will be greatly assisted in accomplishing this if he knows, not only what this amount is in existing locomotives, but also where and in what proportion the losses occur.

Let us look a little into these losses. Consider the coal on the tender. This, if completely burnt, would generate a certain quantity of heat, varying with its quality. But it will not be completely burnt. Some of it will fall, only partially consumed through the bars into the ashpan. Some, also only partially consumed, will be sucked through the tubes and deposited in the smoke-box. Again, a proportion of the carbon in it will escape, unburnt, through the chimney in the form of smoke.

Now consider the heat actually generated in the firebox. This will not be all imparted to the water in the boiler, and so generate steam. Some of it will be lost by radiation from various parts of the boiler and a considerable amount will escape through the chimney in the form of hot gases. However, notwithstanding these losses, the steam generated will contain something like 70 per cent. of the heat theoretically available in the coal.

But now the most serious loss occurs for, of the heat in the steam, only about 20 per cent. can be turned into work, the rest is what is termed "latent" and has, in a sense, already done work in converting the water into steam. Further losses occur through radiation, friction of the steam in passing through the pipes and passages and through the steam being finally exhausted at a temperature considerably above that of the feed water. Altogether, only about 7 per cent. of the heat of the coal is available as work on the pistons. And some of this work is absorbed in driving the engine itself so that, finally, only about 5 per cent. of the heat in the coal is available, as work at the tender drawbar, for pulling the train.

In order to determine the extent of these losses and to ascertain as accurately as possible the factors determining them the engineer requires to know certain items, and the purpose of making an engine test is to find them out. These items are as follows :—

(1) The quantity of coal burnt and its "calorific value," *i.e.*, the amount of heat which would be generated by its complete combustion.
(2) The temperature and chemical composition of the smokebox gases.
(3) The vacuum in the smokebox.
(4) The quantity of ashes in the smokebox and ashpan and their chemical composition.
(5) The quantity and temperature of the feed water.
(6) The pressure of the steam generated (from which its temperature is known).
(7) The degree of superheat imparted to the steam.
(8) The distribution of steam in the cylinders.
(9) The mean effective pressure on the pistons.
(10) The speed of the train.
(11) The pull on the drawbar.
(12) The working of the engine, *i.e.*, the cut-off, regulator opening, &c.

To ascertain the quantity of coal burnt the tender must be cleaned right out, and the amount of coal put on to it weighed, that remaining on it at the end of the trip being again weighed, when the difference will give the amount burnt. In order that all the coal required to produce the work obtained is measured, and only that so required, the fire should be kept up to its full strength until the completion of the trip and the coal used for lighting and making up the fire before starting should not be included. It may, of course, be weighed separately if it is desired to know its amount, but should not be counted as coal burnt on the trip.

The method of weighing the coal will depend on the local conditions obtaining. The simplest and most accurate method, when it is possible, is to fill the tender with water, after coaling, up to a certain mark and then weigh it on a weigh table. At the conclusion of the trip it is filled up to the same mark and again put upon a weigh table. The difference in the two weights will give the amount of coal burnt.

The calorific value of the coal may be

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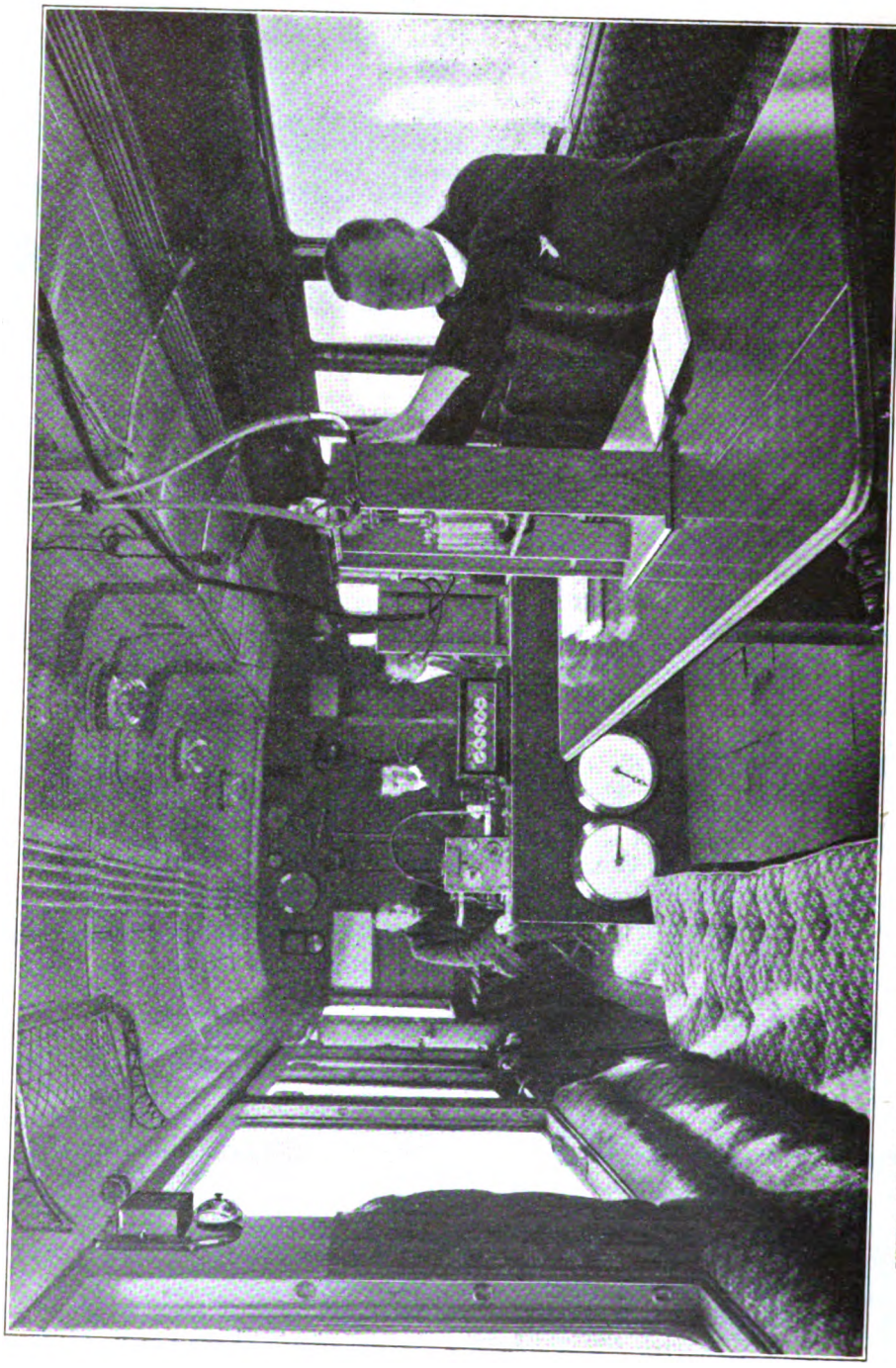

VIEW INSIDE DYNAMOMETER CAR SHOWING CHEMICAL ANALYSIS OF SMOKEBOX GASES BEING MADE.

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determined either by analysis or by experiment. In the former case its exact chemical composition is determined and from this the analyst can calculate its calorific value. In the latter case the outline of the operation is as follows: a small quantity of the coal is carefully weighed in a chemical balance and then burnt in a closed vessel supplied with sufficient oxygen to ensure complete combustion. This vessel is immersed in a known quantity of water, and the rise in the temperature of the water caused by the combustion is a measure of the amount of heat produced.

The temperature of the smokebox gases is ascertained by means of a "pyrometer." This is a sort of thermometer, but is capable of registering temperatures beyond the range of the ordinary mercury type. The temperature is read on a dial, like that of a pressure gauge, which may be placed in the engine cab, or even in a carriage behind the engine, as will be seen later.

Pyrometers are of various kinds. One of the usual types makes use of the fact that two materials, such as steel and carbon, expand unequally when heated, the varying difference in their lengths actuating suitable connections, by means of which the indicating needle is moved over the dial. Another type, known as the "thermo-electric" type, depends on the fact that, when two dissimilar metals are brought into contact, and the ends in contact are hotter than the other ends, a small electromotive force is generated. By attaching wires to the cold ends and leading them to a suitable meter the difference in temperature between the hot and cold ends can be read off. The temperature of the cold ends is measured with an ordinary thermometer.

The chemical composition of the gases may be determined by taking samples in bottles which are then sealed and the contents subsequently analysed in the laboratory; or the analysis may be made *en route*. In either case provision must be made for "inspirating" or sucking the gases into the bottles or analysing apparatus. This may consist of a small hand pump or, on engines fitted with the vacuum brake, a connection may be made to the train pipe. A glass tube leads into the apparatus and another out of it, each being furnished with a short piece of rubber tubing fitted with a "pinch cock," *i.e.*, a clip by means of which the rubber can be squeezed up and the apparatus sealed. One of the rubber tubes is connected with the inspirating apparatus and the other with a pipe terminating, at its further end, in the smokebox. To collect a sample in a bottle both pinch cocks are opened and the smokebox gases sucked through. When all the air is removed, and the bottle contains only smokebox gases, the pinch cocks are closed and the bottle disconnected.

Analysis *en route* is made by means of an "Orsatt" apparatus. This consists of a glass vessel in which the sample is collected and its volume measured. It is then passed in turn into three bottles containing solutions in which the carbon dioxide, the carbon monoxide and the oxygen respectively are dissolved After passing into each bottle the volume is again measured and the amount by which it has diminished gives the volume of the gas dissolved. The residue, after passing through all three bottles, is nitrogen. This apparatus may be fixed up on the side of the smoke box, in the cab or in a carriage behind the engine.

The vacuum in the smokebox is very slight and is measured in inches of water. A foot of water is approximately equal to an inch of mercury. To make the measurement a glass tube is bent to the form of a U, one end of this is connected to the smokebox and the other left open to the atmosphere. The tube is filled about half-way up with water which, of course, when there is no vacuum in the smokebox, will be at the same level in each limb. When there is a vacuum the difference in the two levels will be a measure of its amount. A scale is fixed between the two limbs by means of which this difference can be read, and to facilitate reading it is usual to colour the water slightly.

The method of determining the quantity of the smokebox and ashpan ashes and their composition hardly needs description. They are simply collected and weighed at the conclusion of the trip and samples taken which are subsequently analysed in the laboratory. The quantity of feed water used may be measured either by means of meters on the feed pipes

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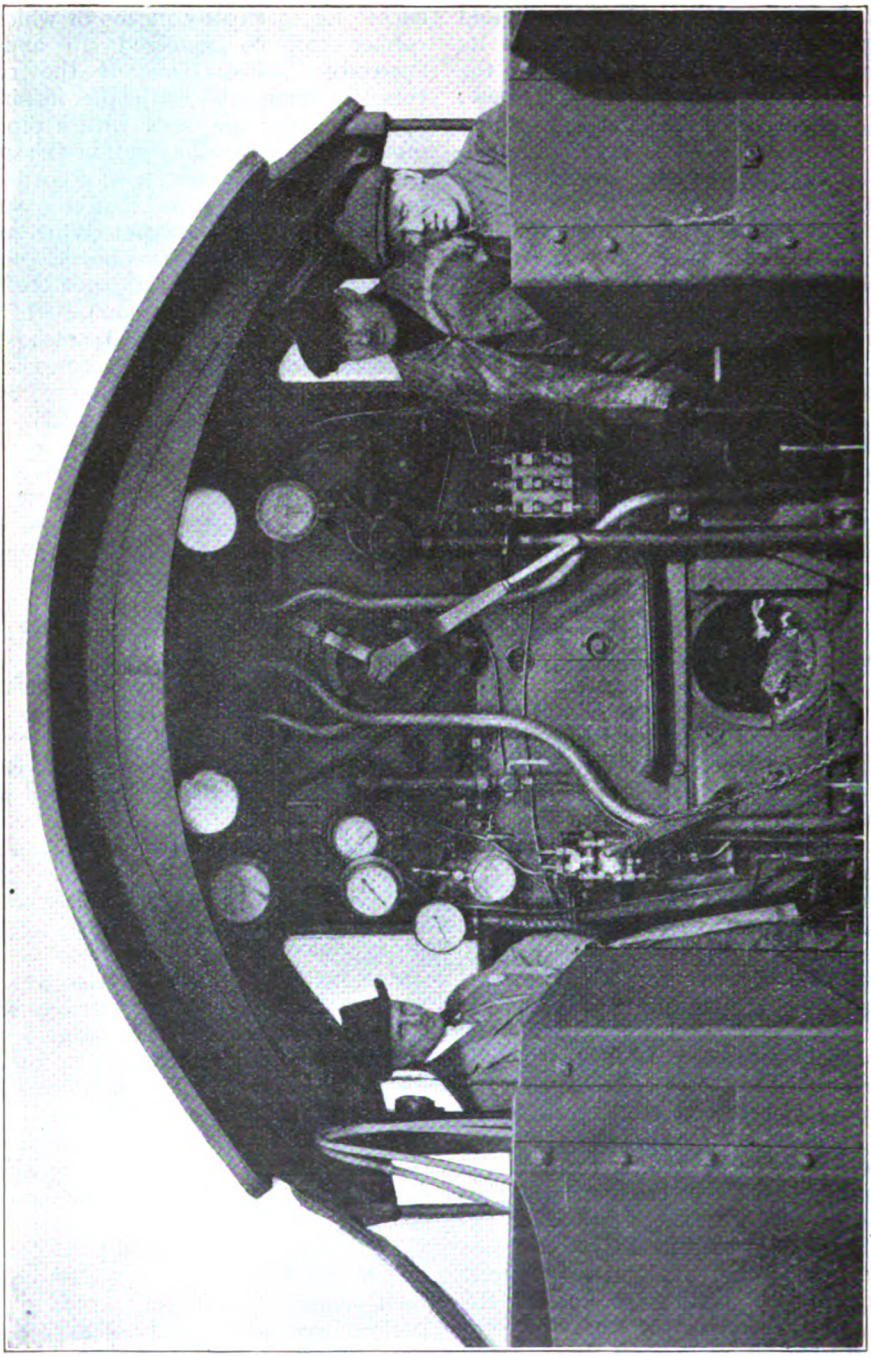

VIEW OF ENGINE CAB INTERIOR SHOWING SPECIAL TEST FITTINGS.

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or by some form of indicator by means of which the quantity of water in the tender at the beginning and end of trip may be read. This may take the form of a glass tube similar to but, of course, much larger, than the water gauge on the boiler, against which a graduated scale is placed. When water is taken *en route* a reading must, of course, be made before and after taking it. The temperature may be taken by drawing samples, at intervals, into which an ordinary mercury thermometer is placed.

The steam pressure is read at intervals by an observer riding on the foot-plate, and from his readings the average pressure throughout the trip is obtained. The degree of superheat is determined by measuring the temperature of the superheated steam by means of a pyrometer. The temperature of the saturated steam can be determined from its pressure by reference to what is known as a "steam table," and when this temperature is known a simple subtraction sum will give the degree of superheat.

The distribution of steam in the cylinders and the mean effective pressure on the pistons are both ascertained by means of an instrument known as an "indicator." This information is extremely useful and the application of the instrument, commonly called "indicating" the engine, is frequently carried out alone apart from any other experimental work. There are various makes of indicator, differing in details, but they all work on the same principle. A small cylinder of about ⅝-in. bore is connected, at its bottom end, to one of the cylinders of the engine. In this small cylinder is a piston, the upward motion of which is resisted by a spring. A pencil is connected to the rod of the piston through the medium of a lever by means of which the motion of the pencil represents, on an enlarged scale, the motion of the piston. The reader will readily see that the greater the pressure of steam in the engine cylinder at any instant, the higher will be the position of the indicator piston, and consequently of the pencil, at that instant. That is to say, the position of the pencil at any time will be a measure of the steam pressure in the cylinder at that time.

Attached to the indicator cylinder is a drum around the base of which a cord is wound. By pulling the cord the drum can be rotated, the rotation being resisted by a spring. When the cord is released the drum will, of course, rotate in the opposite direction. A lever is connected at its long end to the crosshead of the engine and the short end consequently repeats the motion of the piston but on a reduced scale.

To obtain a record a piece of paper is coiled around the drum and clipped to it. The cord on the drum is then attached to the short end of the lever and the motion of the drum will then repeat that of the piston, but on a smaller scale. Between the engine cylinder and that of the indicator is a cock, so arranged that in one position the lower end of the indicator cylinder is open to the atmosphere and, in another, is in connection with the engine cylinder. With the cock in the former position the pencil is pressed against the drum and as the latter reciprocates a straight line will be drawn on the paper. This is known as the "atmospheric" line. The cock is then turned to the other position and the pencil again pressed against the drum. This time a curved line will be drawn the height of which from the atmospheric line at any part of the travel of the drum will be a measure of the pressure of steam on the engine piston at the corresponding part of its stroke. The record thus obtained is known as an "indicator card" or "indicator diagram."

By taking such indicator cards from each end of the engine cylinder, the distribution of steam throughout the stroke can be seen at a glance and the "mean effective pressure," *i.e.*, the average steam pressure on each stroke less the average back pressure on the return stroke, readily calculated. It is usual to indicate one side of the engine only, that is to say, one cylinder in the case of a two-cylinder engine or one inside and one outside cylinder in the case of a four-cylinder engine. As both sides of the engine are actuated by similar valve gear, cards from each side would be identical.

Indicator cards are taken at intervals, which must be sufficiently short to enable the average performance of the engine throughout the trip to be determined with reasonable accuracy. From the mean effective pressure, speed, dimensions of cylinders and diameter of driving wheels, the horse-

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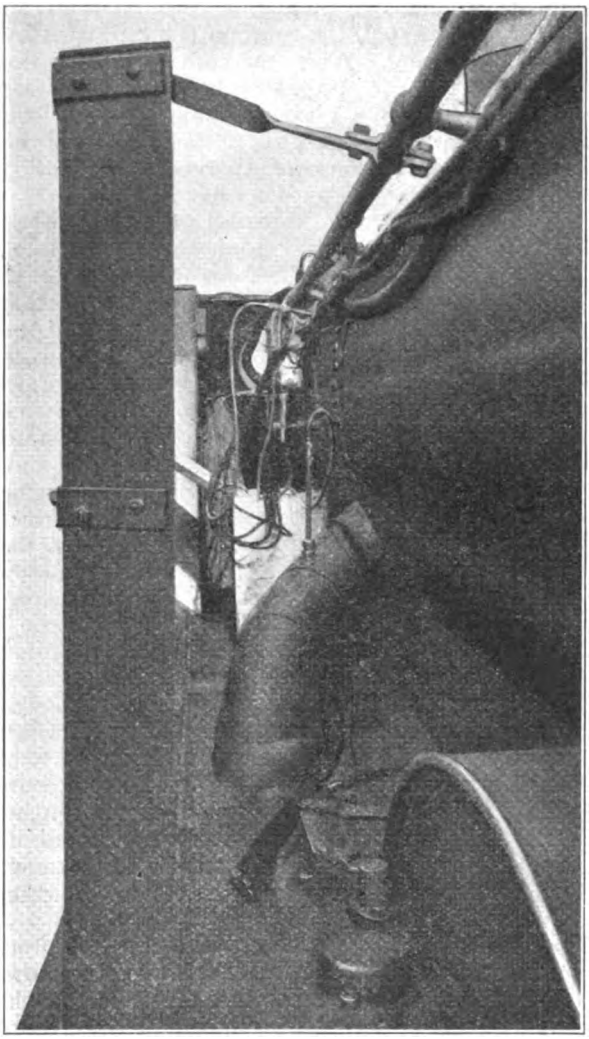

FITTINGS INSIDE FRONT SHELTER (LEFT-HAND SIDE) FOR PYROMETER READINGS, &c.

power developed in the cylinders can be calculated. The horse-power so obtained is termed the "indicated" horse-power, and is often referred to as the "I.H.P."

To obtain a true record it is essential that the pipes connecting the indicators to the engine cylinders should be short. These instruments will thus be situated close to the cylinders, and the men operating them must therefore ride there. A shelter is necessary to protect them (and anyone else who may be riding on the front of the engine for the purpose of reading smokebox vacuum, etc.) from the wind and weather and to prevent them from falling off. Hence the erection around or alongside the smokebox referred to at the beginning of this article.

Speed may be ascertained by means of a stop watch or a speed indicator at the moment of taking indicator cards, but if a "dynamometer car," is being run, as will be the case when a full test is being made, it is best determined therein.

A dynamometer car is a railway carriage fitted with various apparatus, the primary purpose of which is to make a continuous record of the pull on the tender drawbar and the speed of the train. Engine testing is the principal object for which it is designed, but it may be used for other purposes, such as brake trials, train resistance trials, etc. When used for engine testing it is always the first vehicle of the train, thus many of the pieces of apparatus referred to above, such as pyrometer dials, Orsatt apparatus, etc., may be conveniently mounted in it.

A well-equipped dynamometer car will contain apparatus for recording the following items :—

(1) The pull of the drawbar.
(2) The speed of the train.
(3) Time.
(4) Passing of mile posts, stations, &c.
(5) Points at which indicator cards are taken.
(6) The working of the engine.
(7) The work done at the drawbar.

All these items are recorded on a roll of paper which is passed over a table at a speed proportional to that of the train, the travel of the paper usually being from 6 in. to 1 ft. per mile run. The actuating gear is driven from one of the axles of the car or, in some cases, from an extra wheel which can be lowered into contact with the rail when required.

The drawbar pull may be recorded by attaching the drawbar of the car to a spring which will, of course, be deflected to an extent depending on the pull. A bracket is also connected to the drawbar, or to a suitable portion of the spring gear. This bracket is mounted over the table across

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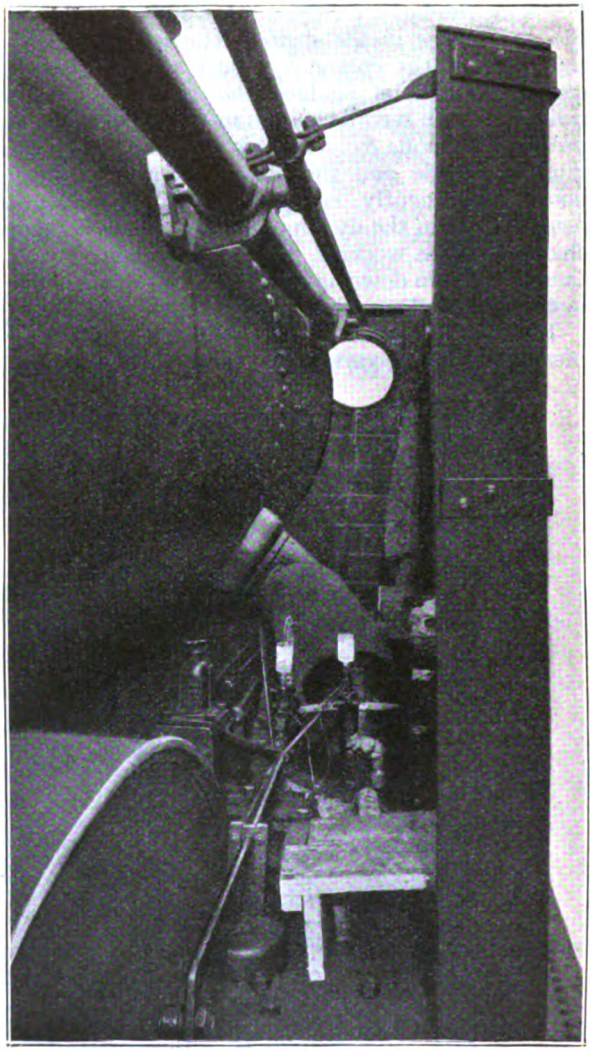
which the paper travels in such a way as to move with the deflection of the spring, in a direction at right angles to the motion of the paper. A stylographic pen is attached to this bracket which draws a line on the paper in the same way as the line drawn by a recording barometer. The distance between this line at any instant and that which the pen would have drawn had there been no deflection on the spring is, of course, a measure of the drawbar pull at that instant. The latter line is drawn by means of a fixed pen suitably attached to the table.

Another method of recording the drawbar pull is to attach the drawbar to a hydraulic cylinder in such a manner that the pressure of the fluid in it (usually oil) varies with the pull. The line is, in this case, drawn on the paper by means of a recording pressure gauge connected to the cylinder.

The speed of the train may be recorded in various ways. Usually it is combined with the record of time in the following manner. A pen, which is mounted over the paper on which the records are made, is attached to an electromagnet in such a way that when the magnet is energised the pen is deflected and a serration is made in the line it is drawing. In the car is a clock arranged to make electrical contact, and so energise the magnet at regular intervals, usually of a few seconds. The reader will readily see that the faster the train, and consequently the paper, is travelling the greater will be the distance between the serrations, and by measuring this distance with a suitably graded scale the speed can be read at any point.

It will be seen that these serrations not only enable the speed to be determined but also form a time record. As, however, the counting up of a large number of intervals of 2 or 3 seconds would be inconvenient in practice, it is usual to record also in a similar manner intervals of 5 or 10 minutes or so.



FITTINGS INSIDE FRONT SHELTER (RIGHT-HAND SIDE) FOR TAKING INDICATOR DIAGRAMS.

The passing of mile posts, stations, &c., is recorded by means of another electromagnetic pen similar to that used for recording time. In this case contact is made by means of an ordinary bell push in the car by an observer riding therein, whose duty it is to watch the road and press the push at the moment of passing any object, such as a station, which it is desired to record. He will, at the same time, call out the name of the station, which is written down against the mark made by the pen by an operator at the table.

The points at which indicator cards are

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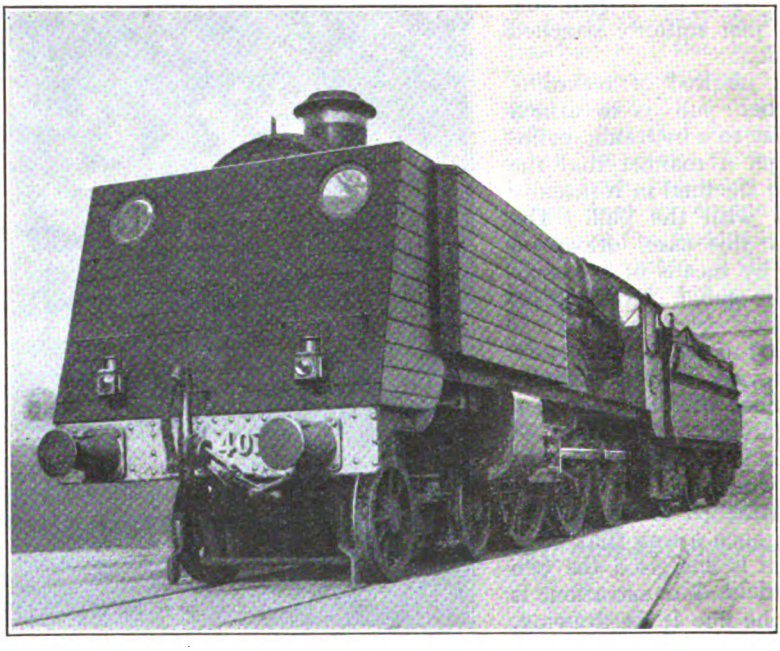
taken is similarly recorded, the push in this case being in the shelter attached to the front of the engine. A push on the engine foot-plate enables the observer riding there to record changes in the boiler pressure, cut-off, &c. In this case notes must be made and the observer's note-book subsequently compared with the record made in the dynamometer car; the changes in the working of the engine can then be written down against the serrations in the line on the record.

The work done at the drawbar is measured and recorded by means of an instrument known as an "integrator." In its most usual form this consists of a horizontal revolving disc, which is driven from one of the car axles or from the extra wheel above referred to. Its speed of revolution will consequently be proportional to that of the train. A small vertical roller rests on this disc, the frictional contact with which causes it to revolve. This roller is connected to the drawbar pull recording gear in such a way that the greater the pull the further is the roller from the centre of the disc and consequenty the faster it will revolve for any given speed of the train. The revolutions of the roller will thus be a measure of the work done and they can be indicated by means of a counter and also recorded on the paper by an electro-magnetic pen.

It may be of interest to the reader to give some figures representative of the performance of an average modern express locomotive.

Water evaporated per lb. of coal	8 lb.
Coal per I.H.P. per hour ..	2¾ lb.
Coal per horse-power at drawbar per hour	4 lb.
Steam per I.H.P. per hour ..	22 lb.
Steam per horse-power at drawbar per hour	32 lb.
Coal per ton-mile	·15 lb.
Coal per sq. ft. of grate area per hour	95 lb.
Mechanical efficiency (*i.e.*, proportion of work in cylinders available at drawbar)	70 per cent.
Efficiency of boiler (*i.e.*, proportion of heat in coal appearing in steam generated)	70 per cent.
Thermal efficiency (*i.e.*, proportion of heat in coal appearing as work) :—	
(A) In cylinders	7 per cent.
(B) At drawbar	5 per cent.
I.H.P. per sq. ft. of heating surface	·65



FRONT END VIEW OF THE "CALDICOT CASTLE," G.W.R., WITH TEMPORARY SHELTER ADDED FOR TESTING PURPOSES.

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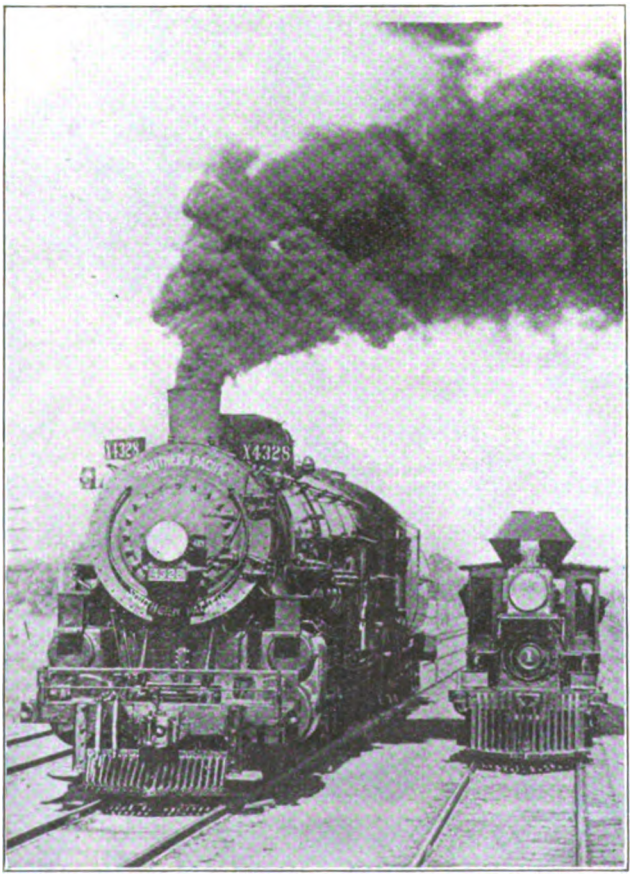
I.H.P. per ton weight of engine and tender	13
Average smokebox vacuum ..	3½ in. of water
Average smokebox ten.perature	600° Fahr.

We have now described, in outline, all the operations involved in the carrying out of a complete engine test. Some of them are by no means easy or comfortable to perform. This is notably the case with indicating. The indicator is a delicate instrument and requires careful handling, and the space in which the operator has to work is usually very limited. He is, too, liable to be subjected to extremes of temperature. Proximity to the smokebox may make him uncomfortably warm on one side while, as the shelter is by no means free from draughts, he may be partially frozen on the other. Much tedious office work is also involved in subsequently making the necessary calculations and tabulating the results.

SIXTY YEARS OF LOCOMOTIVE DEVELOPMENT IN U.S.A.



[*Topical.*

SOUTHERN PACIFIC RAILWAY LOCOMOTIVE No. 1, "C.P. HUNTINGTON," ALONGSIDE MODERN SOUTHERN PACIFIC LOCOMOTIVE.

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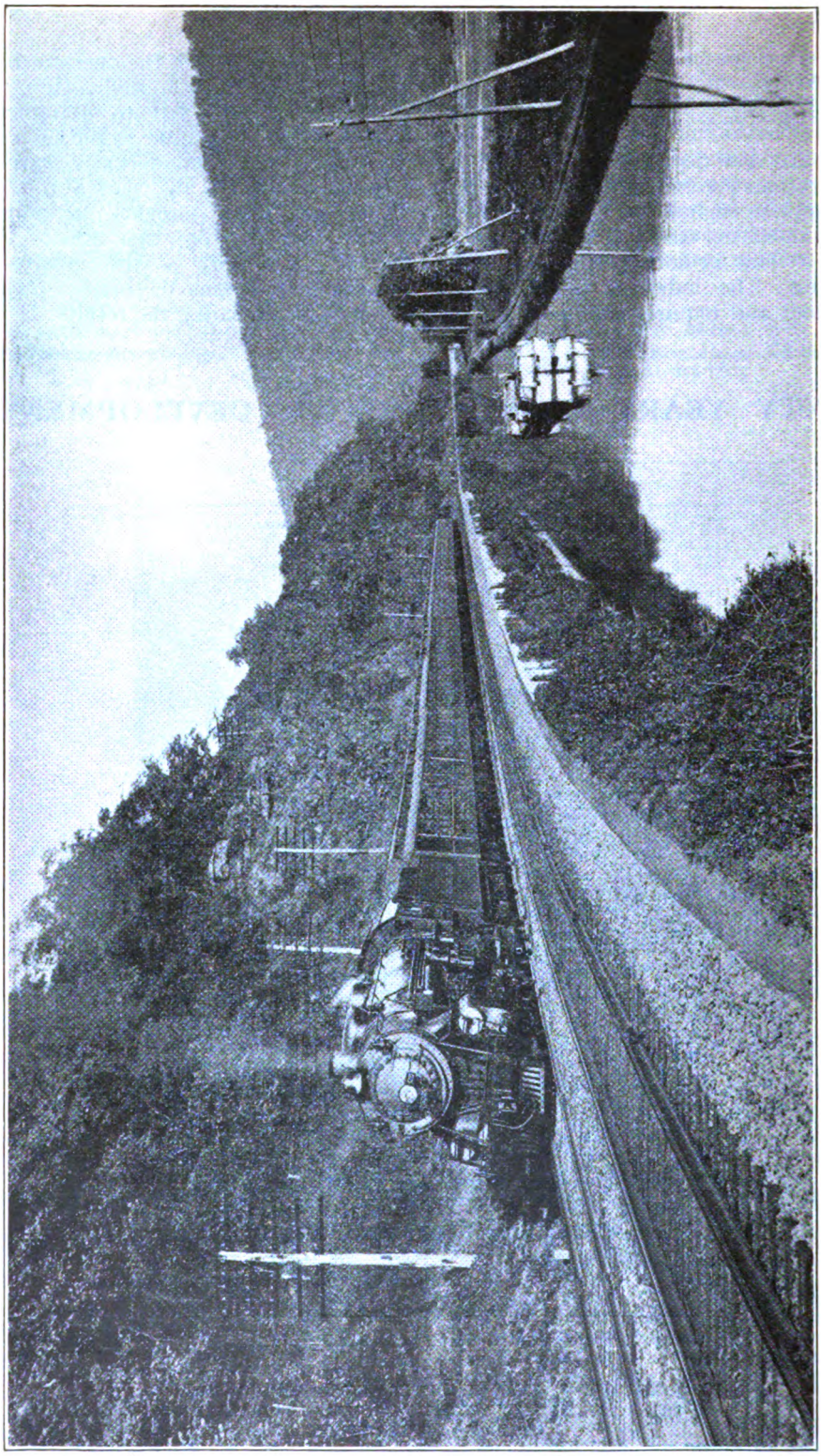

PICTURESQUE TRAVEL ON THE BALTIMORE AND OHIO RAILROAD.

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Express Trains in the United States.

By HUMPHREY BAKER, M.A.

THE express train services of the United States present a far wider field than can be covered by a magazine article. Not only is the route mileage of United States railroads more than ten times as great as that of Great Britain and Ireland combined, but there is far greater variety in their conditions. There is no common measure which one can apply to expresses serving the great cities of the thickly populated Eastern States, and operated at high speed over roads in no way inferior to our own in the standard of their equipment, and those which climb at 20 miles an hour by single tracks to 7,000 or 10,000 ft. summits in the Far West. All that is attempted here, therefore, is to select certain services for more or less detailed treatment, and allow them to stand as representative of their class, classifying trains for that purpose as long-, medium-, or short-distance, and limiting the investigation to roads east of the Mississippi, where population is denser, and general conditions less different from ours, than in the West.

Of long-distance services the journey between New York and Chicago is one of the most important, and through trains are run by several routes; but by none does the average inclusive speed reach 40 miles an hour except by those of the Pennsylvania and New York Central companies. Each of these gives a 20-hour service. The distance is 908 miles by the former, and 978 by the latter, which begins its long course to the west by travelling 150 miles due north, up the valley of the Hudson, but by so doing secures by far the easiest grades of any of the routes.

The Pennsylvania's train, the *Broadway Limited*, averaging 45·4 m.p.h. throughout, is not its fastest long-distance express, the journey-time being determined by that of the longer competing route, whose *Twentieth Century Limited*, therefore, takes first place with an average inclusive speed of 48·9 m.p.h. Between New York and Harmon, 32·6 miles, the train is electrically hauled, and departing from this point on the west-bound journey in 53 minutes from New York, runs to Elkhart, a distance of 845 miles, in 16 hr. 43 min. inclusive, or at 50·5 m.p.h. Seven stops (three for service purposes only) are included in this distance, the longest actual run without stop being the 183 miles from Buffalo to Cleveland, covered at 51 m.p.h., while the fastest is from Toledo to Elkhart, 142·8 miles in 156 min., equal to 54·9 m.p.h. The final stage of 101 miles from Elkhart to Chicago is timed more slowly, providing a recovery margin for delays. Eastbound, the train runs from Englewood (6 miles from Chicago) to Albany, a distance of 830 miles, in 16 hr. 34 min., equal to 50·1 m.p.h., without any passenger stop, but with six stops for service purposes, and covers the 351 miles from Englewood to Cleveland in 6 hr. 41 min., or at 52·5 m.p.h., inclusive of service stops at Elkhart and Toledo. In considering these figures, which show the train to be the fastest in the world over such a distance, emphasis must be laid on two points which are especially prominent in the United States—service slacks and train loads. Of the former, there are 28 between New York and Buffalo alone, or one in every 15 miles. This in itself is hindrance enough to fast running; but it becomes truly formidable in conjunction with the fact that each of the three to five sections in which the train usually runs is composed for at least a portion of the journey of 12 or 13 cars of a total weight behind the tender (in the latter case) of about 900 tons.* Add to this the fact that a maximum speed limit of 70 m.p.h. is in force for this train, and it becomes evident that the main requirement in its operation, in respect of locomotive work, is extreme accelerative power—a statement which holds good, indeed, of American express running in general.

* Weights have been converted to English tons here and elsewhere in this article.

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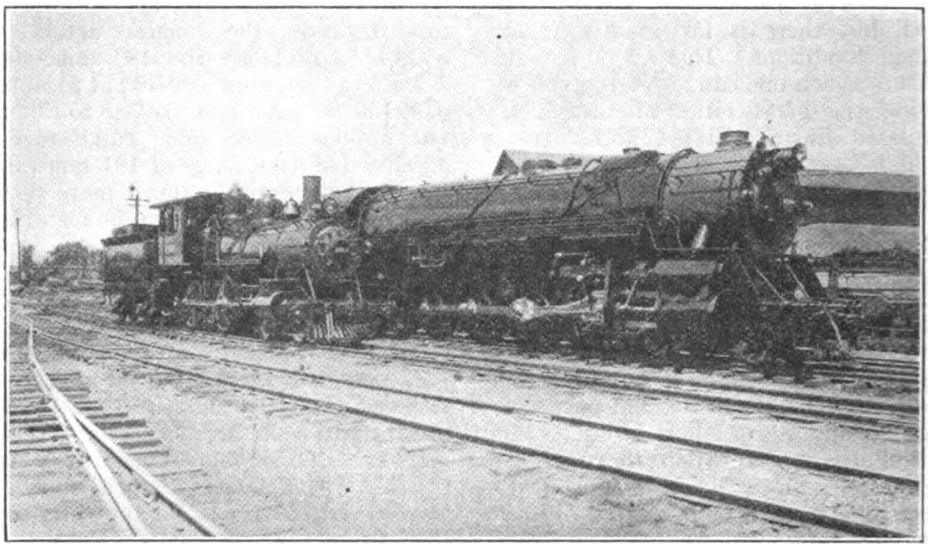
The type of locomotive which is used on this and on other "limited" trains of the New York Central lines (including the "Big Four" and the Michigan Central routes) is illustrated on page 364, and its chief dimensions are given in the table on page 363. The booster, it is interesting to recall, was invented by Mr. H. L. Ingersoll, Assistant to the President of this railroad. It is also noteworthy that one locomotive hauls the train through from Harmon to Buffalo, 406 miles; a second thence to Toledo, 296 miles, and a third for the remaining 244 miles to Chicago.

Between New York and Buffalo the *Empire State Express* is timed slightly faster than the *Twentieth Century Limited*, being allowed 8 hours 7 minutes inclusive, and 8 hours running time, from Harmon to Buffalo, the schedule including two runs at 53½ miles an hour from start-to-stop for distances of 94½ and 80½ miles. This, however, is a somewhat lighter train, weighing about 600 tons.

Both these trains were formerly considerably faster than they are now. The *Empire State Express* reached Buffalo in 8¼ hours from New York, or at 53·1 m.p.h. inclusive, with four intermediate stops; while the schedule of the *Twentieth Century Limited* was 18 hours to Chicago, giving an average speed of 54·3 m.p.h.—a remarkable figure indeed, but one which was subsequently considered to be not worth the difficulties incidental to its working, and so was altered to its present easier level.



ONE OF THE WORLD'S LARGEST "MOUNTAIN" LOCOMOTIVES (BALTIMORE AND OHIO RAILROAD) ALONGSIDE A 4-4-0 BUILT IN 1890.

COMPARATIVE DATA, CLASS "T" AND "M.68" LOCOMOTIVES, BALTIMORE AND OHIO RAILROAD.

	"T."	"M.68."		"T."	"M.68."
Wheel notation ..	4-8-2	4-4-0	Weight—		
Driving wheels ..	74 in.	68 in.	Engine ..	.. 178·5 tons	49·5 tons.
Cylinders ..	.. 30 × 30 in.	20 × 24 in.	Tender ..	.. 115·5 ,,	40·3 ,,
Boiler, diam. ..	92 in.	54 in.	Total ..	.. 294·0 ,,	89·8 ,,
Heating surface	..6,806 sq. ft.	1,488 sq. ft.	Tractive effort	.. 68,200 lb.	19,800 lb.
Grate area	..89.17 sq. ft.	28.33 sq. ft.			

The Pennsylvania's fastest long-distance train—at any rate, over the 440 miles between New York and Pittsburgh, where the routes to Chicago and St. Louis diverge—is *The American*, a limited train from New York to St. Louis. The inclusive speed for the whole journey of 1,052 miles is only 43·8 m.p.h., and is inferior to that of the New York Central's competing train, *The Southwestern Limited*, via Buffalo, Cleveland and the "Big Four" route, which averages 45·8 m.p.h. westbound and 46·6 eastbound over its longer journey

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of 1,158 miles. The speed of *The American*, however, falls off considerably west of Pittsburgh, to which city its westbound schedule is 9 hours 18 minutes, including four intermediate stops, or 47 m.p.h., with several start-to-stop runs at over 50, as from Harrisburg to Altoona, 131 miles, in 154 min., equal to 51 m.p.h. The section of the Chicago *Broadway Limited*, also, which originates at Washington and travels thence via Baltimore to join the main line from New York at Harrisburg, observes the same schedule as *The American* between Harrisburg-Altoona-Pittsburg, and on its eastward journey out of Chicago runs from Englewood to Fort Wayne, 141 miles, in 158 min., or at 53·5 m.p.h., while its inclusive average between Washington and Chicago, with 10 stops, is 44 m.p.h.

These two roads show the best speed on long-distance runs, with the New York Central in the leading position. In other cases, speed is not so high, and inclusive rates of over 40 m.p.h. are not often found. It must be remembered, however, that even the Eastern States contain many mountainous regions involving heavy grades; and that service slacks are almost everywhere so frequent that long-sustained fast running is seldom possible. A case of the former kind of obstacle is that of the Lehigh Valley route between New York and Buffalo, which passes over three summits, of 924, 1,141, and 1,759 ft., in the 448 miles. So too, the Baltimore and Ohio, which books its *Capitol Limited* in 20 hours between Baltimore and Chicago, 823 miles, with 14 stops, or at 41 miles per hour, has found it necessary to introduce the "Mountain" or 4-8-2 type of locomotive to haul this train (and its sister the *National Limited* between Baltimore and St. Louis) through the mountains of West Virginia. Here high speed is impossible; the usual load of the *Capitol Limited* is 10 cars, or 680 tons, and the summit level in the Alleghenies is 2,467 ft. above datum, the last 20 miles of the approach from the east being on an average grade of 1 in 67, which is dealt with by the "Mountain" type unassisted. On level portions of the journey such bookings are in force as 92 min. for 74·7 miles, and 139 min. for 117 miles, the latter equal to 50·4 m.p.h.; and here a "Pacific" of normal dimensions is employed, as shown in the table. Hindrances other than grades may be illustrated by the Illinois Central, which booked its *Panama Limited* from Chicago to New Orleans in 22¾ hours for the 921 miles, or

DIMENSIONS OF EXPRESS LOCOMOTIVES, UNITED STATES RAILWAYS.

Company.	New York Central.	Philadelphia and Reading.	Illinois Central.	New York, New Haven and Hartford.	Chicago and Eastern Illinois.	Central R.R. of New Jersey.	Baltimore and Ohio.
Class	K-3q	G-1	1179	I-4-a	1008	G-2s	P-6
Wheel notation	4-6-2	4-6-2	4-6-2	4-6-2	4-6-2	4-6-2	4-6-2
Driving wheels, diam., in. ..	79	80	75	79	73	79	74
Cylinders—							
Number	2	2	2	2	2	2	2
Diam., in.	23½	25	26	26	26½	26	25
Stroke, in.	26	28	28	28	28	28	28
Boiler, minimum internal diam., in.	71	72	77	76	76	78	76
Heating surface, sq. ft. ..	4,256	4,200	4,451	4,106	4,556	4,907	4,135
Grate area, sq. ft.	56·5	94·5	55·0	59·2	45	94·8	66·7
Steam pressure, lb. per sq. in.	200	220	190	200	185	210	200
Weight, tons—							
Engine	132	122	125	126	117	137	129
Tender	75	82	81	70	79	75	88
Total..	207	204	206	196	196	212	217
Per coupled axle	28·9	26·3	25·2	26·2	24·5	29·1	25·8
Tractive effort..	30,900*	40,900	40,758	40,800	43,300	42,768	40,200

* With booster in action, 40,600. N.B.—All types superheated.

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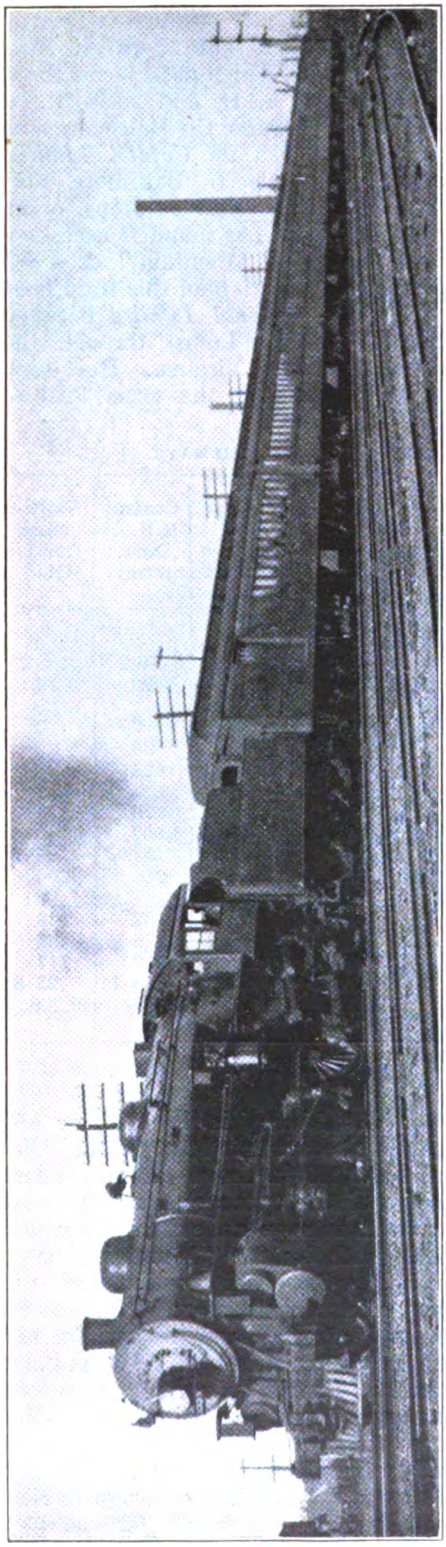

EMPIRE STATE EXPRESS NEAR ROCHESTER, N.Y., NEW YORK CENTRAL LINES.

at 40·5 m.p.h. The southbound train has, in addition to seventeen passenger stops and two water stops, 61 speed limits through towns—that is, actually through the streets—of which 43 are to 6-10 m.p.h., 15 to 12-20 m.p.h., and 3 to 25-30 m.p.h. There is a general maximum limit to 60 m.p.h., and a special limit to 50 m.p.h. over one continuous stretch of 26 miles. There are two additional speed limits for a curve and a bridge; and there are 211 miles of single line. The northbound train is subject to the same restrictions, with slight variations. Even with the very low official estimate of one minute loss for each slow-down, these amount to an hour in each direction, as does also the time spent at stops; so that the actual merit of the work involved is very much greater than would appear from an uninstructed glance at the timetable; and that the task set is actually performed, is proved by the fact that from January to September, 1925, 99 per cent. of the arrivals at the terminals were on time. The grades are easy, with only 37 miles steeper than 1 in 195, the steepest being 1 in 84 (63 ft. per mile) for a distance of 7·9 miles. The tare weight of the train varies accordingly as cars are picked up or set out at various points, but is normally 507 tons behind the tender for 517 miles of its course, rising to 570 tons for 221 miles and falling to 445 for the remaining 183. The quickest start-to-stop schedules are, southbound, from Effingham to Odin, 45·1 miles in 51 min., with six intermediate speed limits to 6-10 m.p.h.; and northbound, from Centralia to Effingham, 53·2 miles in 62 min., with the same six speed limits, and one to 20 m.p.h. through Odin in addition. Four complete trains of Pullman cars and 20 "Pacific" locomotives are required to operate this daily service.

Under the head of medium distance come a number of services between places lying between 200 and 300 miles apart. Between New York and Washington, 226½ miles, the *Congressional Limited* of the Pennsylvania Railroad takes five minutes under five hours, with three intermediate stops, the inclusive and running speeds being 46 and 48 m.p.h. The New York, New Haven, and Hartford line provides four trains daily between New York and Boston, 229 miles, in 5 hours 10 min. with four stops, the corresponding speeds

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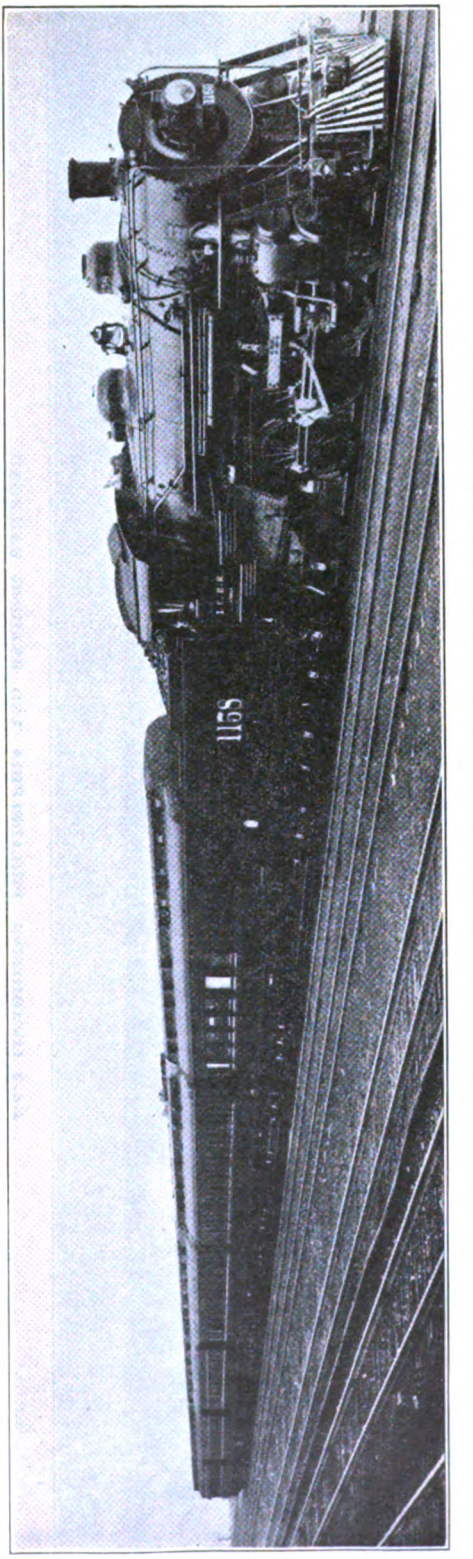
being 44·3 and 46·2 m.p.h. This route, lying for the most part along the Atlantic coast, is easily graded, with a saw-tooth profile of short falls and rises seldom steeper than 1 in 176, the hardest pull being 4½ miles of 1 in 164; but the normal weight of the trains is 674 tons (10 cars) with a maximum of 741 tons (11 cars), and speed restrictions, for draw-bridges in particular, abound. Thus the quickest start-to-stop schedule on the service, the 73 min. for 62·2 miles from Providence to New London (a favourable section containing nothing worse against the train than 3½ miles of 1 in 176, which are followed by 35 miles almost wholly downhill or level), includes speed restrictions to various rates from 30 to 50 m.p.h. on an average once in every 5 miles, in addition to the general restriction to 60 m.p.h. which is imposed over the whole route between New York and Boston.

A highly competitive service at the other extreme of our territory (one of the termini being indeed on the West bank of the Mississippi) is that between Chicago and St. Louis, which has recently been accelerated, and is operated by three roads, the Illinois Central, the Chicago and Eastern Illinois, and the Chicago and Alton. The fastest (the day) trains leave the termini of the different routes within a few minutes of each other, and all take 6½ hours on the journey, for distances (in the above order) of 294, 290, and 284 miles. The inclusive speeds thus range from 45·2 to 43 m.p.h.; but once again allowance must be made for the obstacles *en route*, since though the grades are easy, part of each route is single track—in the case of the Illinois Central, no less than 197 miles out of the 294. This company schedules the 92·7 miles between Kankakee and Clinton, of which 67·5 are single, in 105 and 106 min. from start-to-stop, or at 52·9 and 52·4 m.p.h.; and the northbound train covers the 67·5 miles of single track, with six slow-downs to 6-10 m.p.h., in 75 min. The Chicago and Eastern Illinois has 81 miles of single track in its 290 mile route, on which the maximum grade is 1 in 200 in both directions except for short lengths near the terminals. The normal train load is six cars, or 380 tons, and the intermediate 281 miles between Englewood (Chicago) and Washington Avenue (St. Louis) are



"PANAMA LIMITED" EXPRESS NEAR CHICAGO, ILLINOIS CENTRAL RAILROAD.

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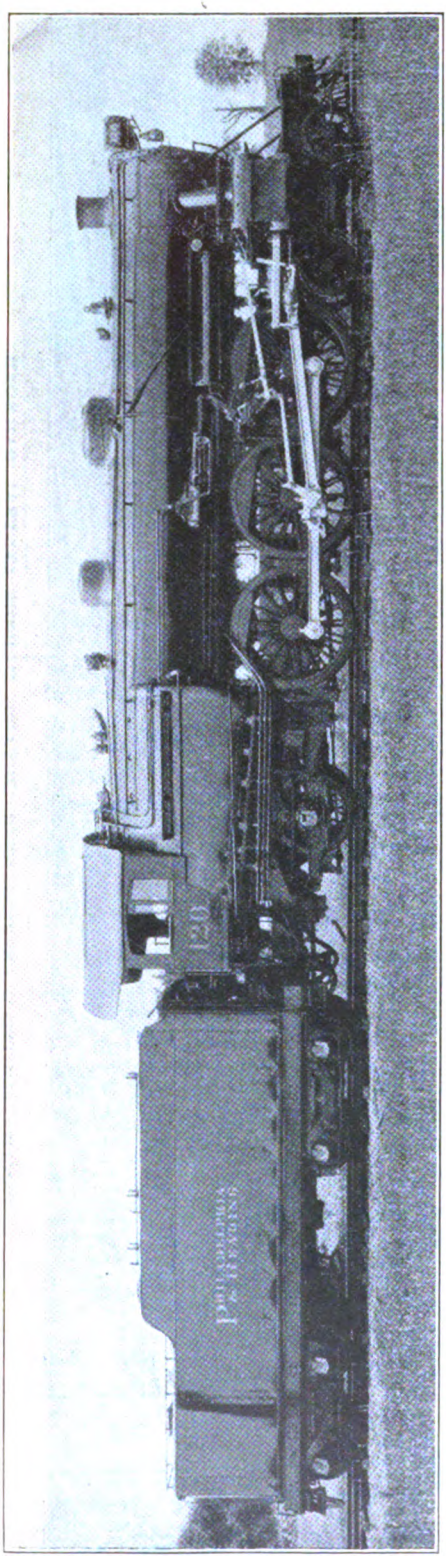

4-6-2 LOCOMOTIVE, PHILADELPHIA AND READING RAILROAD.

run in 6 hours 5 min. (46·2 m.p.h.) with one regular and eight conditional stops. From the introduction of this schedule in April, 1925, till the end of September, the proportion of punctual arrivals of the trains (one daily in each direction) was 93 per cent. As in other cases, a " Pacific " type of locomotive is used, the dimensions of which are given in the table.

Among journeys of this length, the Michigan Central portion of the New York Central lines, which provides an alternative route between Chicago and Buffalo by way of Detroit and the north shore of Lake Erie, also deserves mention. *The Detroiter* runs between Detroit and Buffalo, 236 miles, in 4 hours 40 min. eastbound and 4 hours 45 min. westbound, or at 50·5 and 49·6 m.p.h. inclusive. But terminal delays are exceptionally severe at both ends of this journey, since the international boundary between the United States and Canada, involving both customs and immigration inspection, is crossed soon after leaving Detroit, and recrossed on approaching Buffalo; and the intermediate run of 228 miles between Windsor (2·8 miles from Detroit) and Bridgeburg is made in 247 min. eastbound, and 246 westbound, with a five-minute stop at St. Thomas, 109·6 miles from Windsor. The average running speed for the 228 miles is thus 56·5 m.p.h., which is made with a normal train load of 700 tons, rising on occasion to over 1,000. Even higher speeds are made from Windsor by the eastbound *Trans-Atlantic Limited*, which diverges from the usual Fort Erie route in order to pass near Niagara Falls, and is allowed only 111 min. for the 109·6 miles to St. Thomas, and 112 for the 111·4 thence to Falls View. The former stage includes a pass-to-pass schedule of 97 min. for 102·5 miles (63·3 m.p.h.), and the latter, one of 104 min. for 107·3 miles. This train appears in the public time-table as making no stops between Detroit and Falls View, 224·7 miles, but does in fact stop at Windsor and St. Thomas. It should be noted that American time-tables contain many cases of apparently non-stop runs which are not so in fact, stops being made intermediately for water, changes of locomotive, crossing other trains, and so forth; and also that though bogie rolling-stock is universal,

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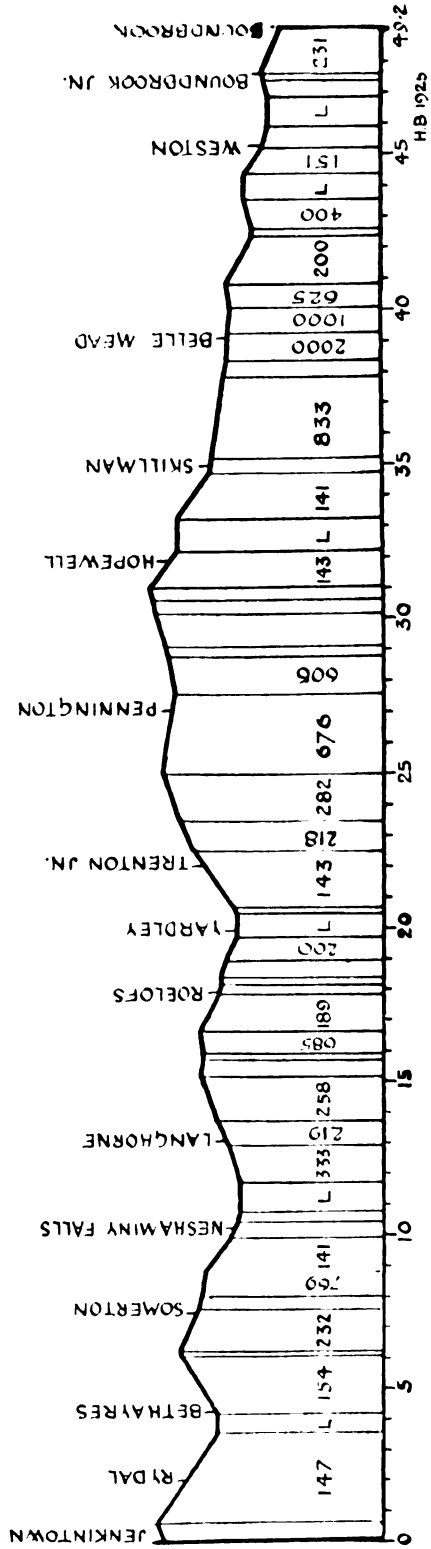
the weight of cars varies greatly, those included in the trains mentioned in this article ranging from about 50 tons for a "mail" car to 70 tons or more for a Pullman dining car.

Lastly, we have the short-distance journeys, say, under 150 miles, comparable with many in our own country. Here, in respect of booked times without reference to conditions, England makes the best showing. Typical schedules are those between New York and Philadelphia in two hours (91 miles), Philadelphia and Baltimore in 115 min. (95 miles), Baltimore and Washington in 50 min. (40 miles), New York and New Haven in 99 min. (72 miles), Pittsburgh and Cleveland in 3 hours 30 min. (138 miles), Chicago and Milwaukee in 105 min. (85 miles), and so on. None of these reaches an average rate of 50 m.p.h., and such a rate, even between first-class stations, is the exception rather than the rule. But the difference in conditions affects even these short runs. Between New York and Philadelphia for instance, by the Reading Company's route, the standard timing of 113 min. between Jersey City (the rail terminal for New York) and Philadelphia, 90·2 miles (barely 48 m.p.h.), includes seven stops and four severe and two slight service slacks, in addition to a general speed limit to 70 m.p.h. throughout the distance, and to 40 for the last six miles into Philadelphia; while one or two trains which make fewer stops have additional speed restrictions at the stations omitted. Consequently, on the standard timing, the 30·2 miles between Jersey City and Bound Brook occupy 40 or 41 min., with two intermediate stops, and the 10·8 miles between Philadelphia and Jenkintown, 22 or 21 min., also with two stops, leaving only 51 min. for the intermediate 49·2 miles between Jenkintown and Bound Brook, with stops at each of these places and intermediately at Trenton Junction, 22 miles from Jenkintown. The distance is, in fact, covered by one eastbound and one westbound train in 49 and 50 min. respectively, the 49-min. schedule consisting of start-to-stop times of 22 min. from Jenkintown to Trenton Junction, and 27 min. thence to Bound Brook (60 and 60·4 m.p.h.), from which must be deducted the duration of the stops at Trenton Junction and Bound



GRADIENT PROFILE BETWEEN JENKINTOWN AND BOUNDBROOK, PHILADELPHIA AND READING RAILROAD.

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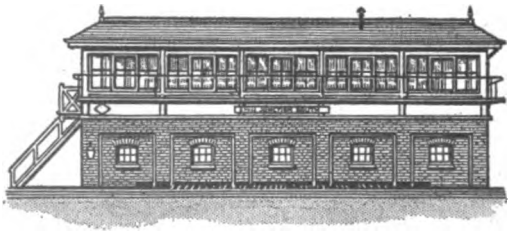
Brook respectively, for which no fixed allowance is made. Even these short runs include service slacks at Neshaminy Falls to 30 m.p.h., and Yardley to 45; while the course is not particularly easily graded, as appears from the profile reproduced on page 367. Over this decidedly undulating road, the 22 and 27-min. schedules are observed twelve times in all (the former nine times and the latter three), while a number of other trains make the former run in 23 or 24 min. and the latter in 29, and one Sunday train actually reaches Trenton Junction in 22 minutes from Jenkintown with an intermediate stop at Langhorne, 13 miles out.

The trains are by American standards light, consisting of from four to six cars weighing from 220 to 320 tons; while the type of locomotive is illustrated on p. 366, and its dimensions are given in the table. The very large grate area of this type, and of that of the Central Railroad of New Jersey (not illustrated) is due to the employment of the wide firebox. The same type of locomotive works the trains between Camden and Atlantic City. These are more familiar to English readers than those between New York and Philadelphia; but they are not now timed at the remarkable speed of former days, when the schedule was 50 min. for the 55.2 miles, the present booking being 55 min. from Atlantic City to Camden, by five trains daily, and 57 min. by three trains in the opposite direction. On the outward journey, however, the ferry boat from Philadelphia is usually four or five minutes late, and the run is then made in not more than 53 or 52 min. Moreover, the load behind the tender has grown from the 210-250 tons of the beginning of this century to a standard make-up of 12 steel cars with a tare weight of 643 tons. It is worth recording that the fastest run ever made between Camden and Atlantic City by this route was on a date in August, 1907, when with a load of 280 tons the 55.2 miles were covered in 42 min., or at 78·6 m.p.h. from start-to-stop.

The Pennsylvania Railroad has five trains scheduled in 57 or 58 min. for its 59 miles between the same stations, and other 60 m.p.h. timings are in force on the Atlantic City service, such as 27 min. for the 28 miles between Atlantic City and Hammonton, by the Reading Company's route.

As to the locomotive dimensions in general, it will be seen that reliance is in every case placed on a straightforward two-cylinder design with large dimensions, heavy axle load, superheater, and high steam pressure, the wide limits of the loading gauge enabling ample power to be obtained in this way without recourse to complications, except that a booster is occasionally added to aid acceleration. Acceleration is in fact the key to the situation: the enormously heavy loads and the great number of intermediate delays necessarily affect the schedules to some extent; but the development of the power (and the practice) of rapid acceleration to the utmost has enabled average journey-rates to be maintained which would scarcely be contemplated under like conditions in this country and has secured a very high level of punctuality in arrivals at destinations, even in those cases in which track conditions impose a limit upon maximum speeds.



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British Locomotive Practice and Performance.

By CECIL J. ALLEN,
M.Inst.T., A.I.Loco.E.

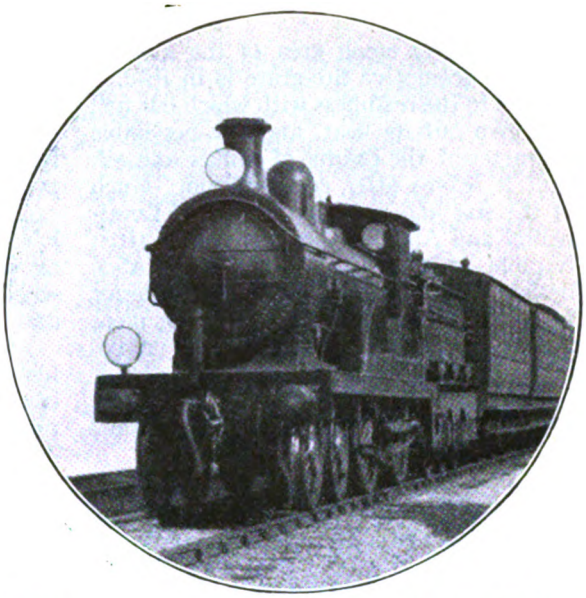

Photo.] [*E. A. Gurney-Smith.*

DEAL TO READING AND LONDON TRAIN NEAR PENSHURST.

Southern (S.E. Section) 4-4-0, No. 214.

A RECENT conversation with a friend has started a train of thought in my mind which may quite profitably serve as the subject of our "Practice" consideration in the present article. The conversation revolved around the perennial contention as to whether—if the non-technical terms be permitted, for want of any more expressive—the "big" or the "small" engine, when all the factors bearing on the comparison have been duly taken into account, is ultimately the more economical in the operation of traffic. We had been discussing in particular the wonderful work of the "George the Fifth" class 4-4-0 engines of the late London and North Western Railway in days gone by, their rostered tare train-loads up to 420 tons in weight, and the apparent ease with which they handled them, even on schedules up to 55 m.p.h. over long distances.

The exploit of *Wild Duck*, which succeeded in regaining 13 mins. of lost time between Willesden and Crewe, with a 410-ton train, on a booking of 162 mins. for the 152.6 miles—involving an average speed of 62 m.p.h. for 150 miles on end—was especially in mind. Finally the argument reduced itself to this: Was it more economical to employ the "big" engine, with an ample reserve of power to meet all contingencies, or did the advantage lie with the "small" engine, which could be worked economically on turns of average difficulty, and could also handle very much harder trains, when occasion required, provided no limit was placed on coal consumption, and the costs of upkeep were not too narrowly scrutinised? My friend's parting shot in support of the "small" engine, and more especially the type last-mentioned was, "After all, they earned dividends"!

It is a fact known, I suppose, to most readers, that the train services of Great Britain, proportionately to their speed, the loads hauled and the gradients traversed, are worked by smaller locomotives than those of almost any other country in the world. At first sight this appears to be a matter for self-congratulation; but it is not necessarily the case. There are reasons why, on the one hand, it is *possible* to do equally hard work in this country with a smaller engine; and there are also reasons why, on the other, considerable economies might be effected—on some lines at least—if larger and more powerful engines were employed.

Coal has, to a large extent, been a governing factor. The quality of British coal is the best in the world, and the

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comparatively small area of the average British locomotive fire-grate is in itself a tribute to the readiness with which our fuel will give out its heat, and the negligible character of the residue of clinker and ash that it leaves after consumption. Much of the size and weight of "large" Continental and American locomotives is attributable to the size of their fire-grates, designed for the consumption of inferior fuel, and the necessity of providing more ample flue passages from firebox to smokebox—which means a larger diameter boiler—with a view to securing more effective draught. The larger Nord 4-6-2 engines, which have figured so prominently in recent articles of this series, are a striking example. In this design the firebox—with its fire-grate 11 ft. 6 in. in length—reaches right forward to the centre coupled axle, converting what might otherwise have been concentrated on a 4-6-0 wheelbase into a "Pacific."

Then, again, coal here has been cheap, within limits, but little stress has been laid in past years on the necessity for strict economy in its consumption, at least until the time of the war. As has often been argued previously in these columns, this cheapness has, with little doubt, retarded the development of the British locomotive from the thermal efficiency point of view. Mechanical efficiency has been improved unceasingly, but the science of getting the very maximum possible value, in work done, out of each ton of coal burned on the firegrate has not received the same attention here as it has, say, in France or Germany, where fuel has been both more costly and of inferior quality.

So far as concerns this country, what has been the result. Until the close of last century, and, indeed, well into the present one, when 4-4-2 and 4-6-0 express passenger designs were already widely used on the Continent and in America, the general custom here was still to build 4-4-0 engines with boilers affording round about 1,500 sq. ft. of heating surface and with cylinders of about 19-in. diameter and 26-in. stroke. The small fire-grate, from 20 to 22 or 23 sq. ft. in area, did not make for efficient combustion of the fuel; but the engines were cheaply built, with their gross weight of about 50 tons they were light on the track, they did their work in a satisfactory manner, and, last of all, whenever necessary, they could be "thrashed" in order to perform con-

Photo.] [*H. Gordon Tidey.*

VICTORIA-DOVER CONTINENTAL PULLMAN EXPRESS.

Southern 4-6-0 locomotive No. 769E, "Sir Gareth."

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siderably harder work than that for which they had been designed, given unlimited coal consumption.

It was Mr. H. A. Ivatt, on the Great Northern, who first seriously took an opposite view, and had sufficient courage of his convictions to put them to an extensive test. In 1898 he had produced his first "Atlantic"—No. 990—which was, in itself, a revolutionary design; but it was No. 251, the 1902 pioneer of the 5-ft. 6-in. boiler Great Northern "Atlantics," that offered an even more violent contrast to the notions of design then current with locomotive designers in this country. Not only did his use of a wide firebox increase the area of the fire-grate, at one bound, to 31 sq. ft., and, again, the large diameter boiler, incorporating 2,500 sq. ft. of heating surface, add a round 1,000 sq. ft. to the highest corresponding figures of that time, but, on the other hand, the cylinder dimensions of some 19 in. by 26 in. then in vogue were *reduced* to 18¾ in. diameter by 24 in. stroke. With his increased size of boiler and fire-grate, therefore, coupled with reduced cylinder dimensions, Ivatt had introduced an engine almost incapable of being thrashed, but designed, on the other hand, to have a supply of steam more than equal to any of the demands of that period, while at the same time slowly and efficiently burning its fuel.

What the Great Northern "Atlantics" have done in the way of locomotive work from that day to this, with no further alteration in design than the addition of superheating apparatus, and the concurrent enlargement of cylinder diameter to 20 in., is common knowledge. Their feats of haulage have often been described in these columns, and they remained the standard type for main-line work on the G.N.R. for twenty years, until the advent of the Gresley "Pacifics" in 1922. The Ivatt "Atlantic," indeed, was a more than sufficient answer to the tendency of locomotive engineers of his time to imagine that a successful locomotive design could be made to meet increasing demands in the way of load and speed by the simple expedient of enlarging cylinder dimensions alone. This very error had been made by his immediate predecessor, Stirling, who, by adding 1½ in. to the diameter of the 18-in. by 28-in. cylinders of his famous 8-ft. singles, produced a final series of engines which ill compared, for efficient working, with those which had preceded them.

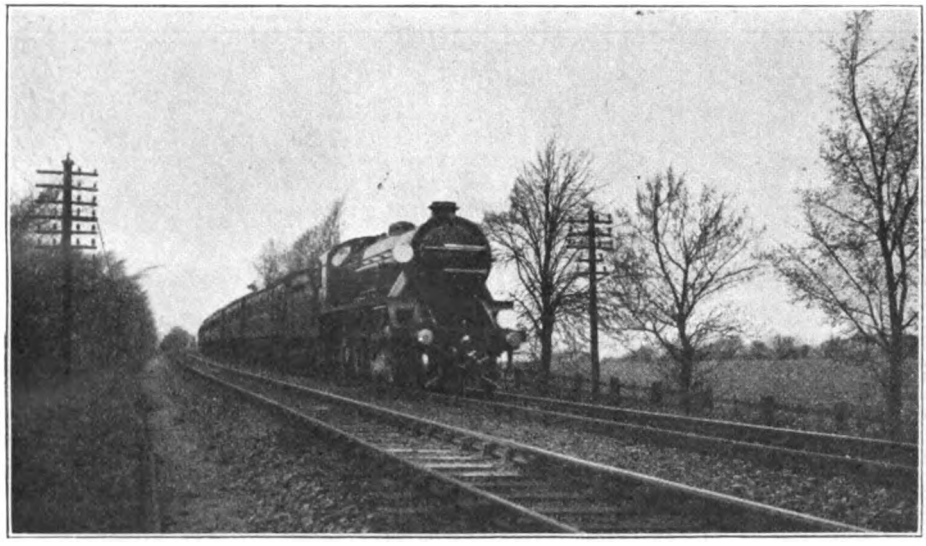

Photo.] [*R. D. Lund.*

DOWN DOVER CONTINENTAL EXPRESS ASCENDING KNOCKHOLT BANK AT 35 M.P.H.

Southern 4-6-0 locomotive No. 772E, "Sir Percivale."

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Another minor influence of the preference of locomotive engineers for "small" engines was probably the desire to keep the centre-line of the boiler as low down as possible, with a view to maintaining a low centre of gravity of the engine as a whole. The stability of the large-boilered modern locomotive at high speeds had yet to be put to the proof, and still more so in countries other than our own, where, on the same gauge, boilers of far larger diameter and higher pitch are employed without any danger of overturning on curves.

But the most potent factor of limitation in size has been, without doubt, the desire to limit the maximum weights passing over the track. On some routes this limitation still operates, and in a severe degree. Over the Midland main line, for example, a 77-ton engine of the North Western "Claughton" type is even yet not permitted to make more than six consecutive runs, by way of experiment, in any one period over the same route. But there is reason to believe that work now in hand on bridge replacements will enable such restrictions to be removed in about two years' time. The Chatham section of the late S.E. & C. line permits of no heavier than a 50-ton locomotive, albeit there is performed over it the hardest work of the Eastern Division entrusted to 4-4-0 engines. Over the other sections of the late S.E. & C. line, this problem of bridgework has been faced with courage and enterprise by the Southern Railway authorities, with the result that, in a very short space of time, all the weak underline bridges which have not yet been, soon will be renewed in such a way as to permit of the free use of the 80-ton "King Arthur" locomotives. In this way large economies have already been effected in working the Continental services, by the reduction in the number of duplicate trains, apart from any which may have arisen from the more efficient use of fuel. But on the latter point more in a moment.

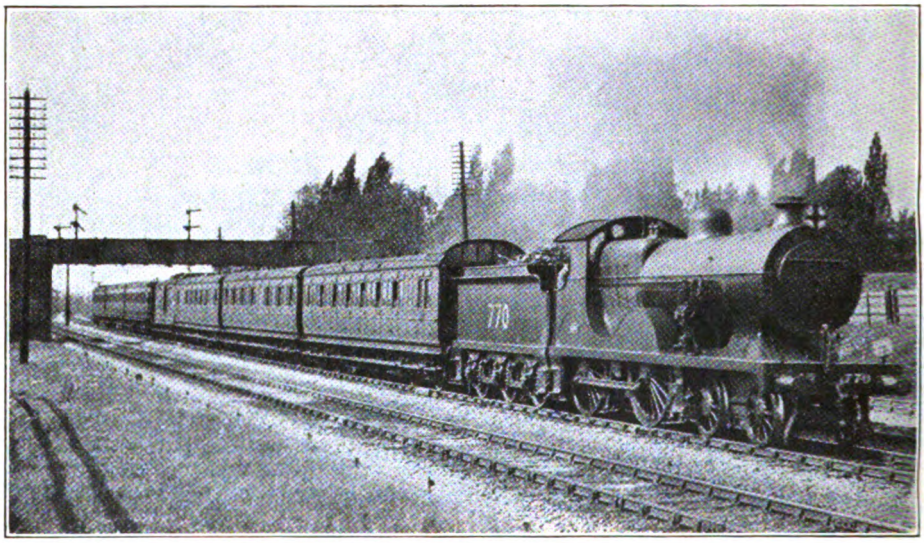

Photo.] **HASTINGS EXPRESS PASSING GROVE PARK.** [*J. F. Dearden.*

Southern (S.E. Section) 4-4-0 locomotive No. 770A.

The Southern Railway does not intend to stop there. It is common knowledge that a four-cylinder 4-6-0 express engine is being constructed by this company, with the intention of rendering possible a two-hour journey to Bournemouth with a 500-ton train. Similarly, the L.M.S. Company has in hand a powerful 4-cylinder compound "Pacific" design which will take 500-ton expresses over Shap Summit without assistance. At present, on the latter line, maximum unpiloted tare trainloads, as I mentioned recently, have been reduced, during ten months of the year, to

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360 tons for all classes of engine, or 60 tons less, say, for a "Claughton" than was once taken by a "George." Although doubtless the object is to cut down coal consumption as well as costs of maintenance, on a line where such a figure as 360 tons is so frequently exceeded—on some trains daily—it should not be necessary in these days to pilot trains of so comparatively modest a weight.

From the track maintenance point of view, a minimum of over 200 tons of locomotive and tender weight is passing over the road as compared, say, with the 119 tons of a Great Western "Castle" or the 148 tons of a L.N.E.R. "Pacific," both of which types are handling loads up to 500 tons, either at higher average speeds, in the former case, or (except only as compared with Carnforth-Carlisle) over a harder road, in the latter. From the running costs point of view, two drivers and two firemen are being paid, instead of one crew; and the coal consumption and wear and tear of two engines is almost certain to exceed that of the one larger machine. From whatever angle the matter is viewed, therefore, the practice of constant piloting, over a route which provides so ample a number of express trains of gross weights suitable for "large" engine haulage, hardly seems justifiable.

And what of routes over which the number of "abnormal" workings is only limited? This is a different matter altogether. If the heavy engine is not kept at work chiefly—or so far as time-table arrangements permit—on work of a character suited to its capacity, then, however economically it may be working as regards coal consumption, on the majority of its duties it is hauling about a great deal of unnecessary weight in the propulsion of itself alone. I doubt if the average load taken on *all* the workings of the L.N.E.R. "Pacifics" over the North Eastern Area of that system, during the major part of the year, greatly exceeds 300 tons per train; which means that one-third, on the average, of each train formation consists of engine and tender. A large proportion of these duties could be undertaken by the "Z" Class "Atlantics" without difficulty, saving 30 tons—the equivalent of a corridor coach—of gross train weight on each trip. In such circumstances it does appear questionable if the use of the very large locomotive offers any ultimate economy.

The solution of the problem seems to be that, where the number and difficulty of the locomotive turns justify it, the "large" engine is a more economic proposition than a "general purposes" loco-

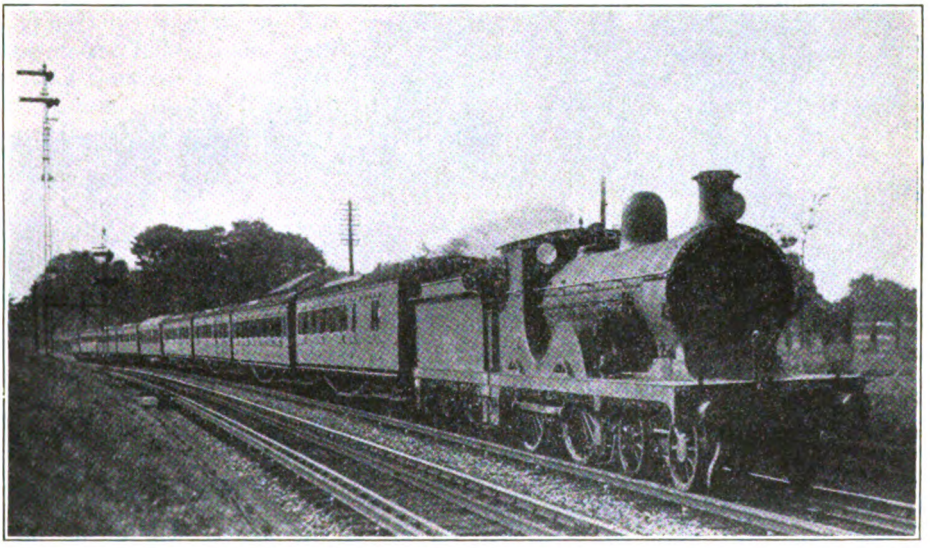

Photo.] **DOWN GRANVILLE CORRIDOR EXPRESS NEAR BICKLEY.** [*F. E. Mackay.*

Southern (S.E. Section) locomotive, No. 732

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motive of smaller dimensions, which either requires to be "thrashed" or to be piloted under abnormal conditions. For routes over which such conditions do not obtain, the chief lack of economy in the use of very large engines appears to be the haulage of so much unnecessary weight, increasing both coal consumption and track maintenance. But even on many such routes as the latter, consideration of time-table arrangements often reveals ways in which comparatively light trains at present running in duplicate might be combined, thus furnishing a "large" engine proposition of haulage. So, on our chief main routes, large and powerful designs, both passenger and freight, are undoubtedly called for by present-day conditions; and this fact, which has been already recognised and acted upon by two of our great railway groups, is now in course of recognition by the two others. I have classed the Great Western with the London and North Eastern as having adopted the "large" engine principle, though, strictly speaking, Swindon has so mastered the theory of locomotive design as to produce engines of moderate weight whose hauling powers, without thrashing, have been proved equal to those of considerably larger and heavier engines elsewhere.

The illustration I am now about to give is one of the most striking examples within the range of my experience of the relative value of the "small" and "large" locomotives. It will also serve, incidentally, to explain why readers who have been searching these columns anxiously for details of the work of the "King Arthurs" on the Dover boat expresses have as yet failed to receive any satisfaction of their curiosity. Last summer, by the courtesy of the Southern Railway authorities, I was permitted to make a footplate journey for the purpose of observing their work over the route concerned. The train selected was the 10.45 a.m. relieving boat express out of Victoria, which was, as usual, made up just within the rostered tare tonnage of 425; actually, with 7 Pullmans, 3 corridors, 2 six-wheelers and 2 luggage trucks, our load was 418 tons net, and 435 to 440 tons gross behind the engine tender. No. 772, *Sir Percivale*, was the engine, in charge of Driver W. Barber and Fireman Hawkes.

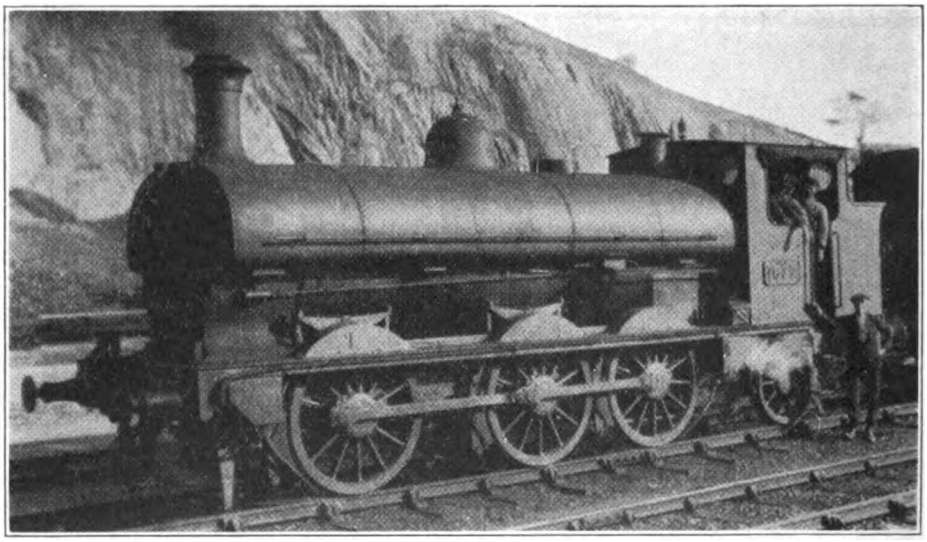

Photo.] **CAMBRIAN 0-6-2 SADDLE TANK ENGINE No. 1677.** [*H. T. Hobbs.*

Rebuilt with certain G.W.R. fittings, &c.

Starting in full forward gear, and with regulator gradually advanced to full open, we got away up the 1 in 64 to Grosvenor Bridge without an atom of slip, despite a misty morning and greasy rails; but we were assisted in rear to the top of the bank.

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Cutting off at 25 per cent. from Battersea Pier Junction onwards, we were through Herne Hill in 7 min. 35 sec. From here Driver Barber, evidently aware of probable delays in the electrified area—which, sure enough, we suffered—did not hurry ; even up the 1 in 101 to Sydenham Hill cut-off was not advanced beyond 35 per cent., and at the crest of the rise it was brought back to 30 and the regulator half-closed. The latter station was passed in 13 min. 5 sec., and Beckenham Junction in 17 min. 40 sec., after which came signal checks all the way to Bickley Junction.

For the rising grades from there to Knockholt, Driver Barber employed 35 per cent. cut-off and full regulator, the speed, with this 440-ton train, rising to 43½ m.p.h. up the 1 in 310 beyond Orpington and falling again to 34½ up the 1 in 120 Knockholt Summit. We had taken 27 min. 10 sec. from Victoria to Bickley Junction, 31 min. 20 sec. to Orpington, 14·9 miles, and 35 min. 40 sec. to Knockholt, 17·6 miles, the excess of 2¾ min. over schedule being accounted for by the signal delays. Cutting off at 30 per cent., and with regulator not more than one-quarter open, we then spun down to Tonbridge, touching 64 m.p.h. at Dunton Green and 72½ at Hildenborough. Sevenoaks had been passed in 41 min. 50 sec., and Hildenborough in 46 min. 40 sec.

Then a most aggravating thing happened. We were stopped twice outside Tonbridge, and at last were allowed to draw into the station. It appeared that one of those mishaps which disturb the serenity even of the best-regulated families had seen fit to happen on this very day. A coach had strayed from the prescribed route at Paddock Wood, and had left a portion of its miserable carcase in the "six-foot." It would be possible for our train to pass, but not, alas! our engine, which, it was feared, might foul the delinquent. Consequently two other engines had been unearthed in the precincts of Tonbridge, and to this strange assortment—No. 441, a domeless Stirling 4-4-0 and No. 444, a Kirtley 4-4-0—*Sir Percivale* had to resign his train. Driver Barber and his mate transferred on to the first-mentioned—incidentally leaving to *Sir Percivale*, in virtue of the exchange, the indignity of shunting for the next hour or so in Tonbridge yard—and I, determined to see the thing through, transferred with them.

Progress to Paddock Wood was slow, and it was at a snail's pace that we crawled past the derailment. It took a long time subsequently to get into any speed, too ; we reached 50 an hour before Marden, fell to 47 and then rose to 57½ between there and Staplehurst, fell to 48½ before Pluckley and passed that station at 53½, and then fell to 51 up the subsequent 1 in 200 before passing Ashford at 57 m.p.h. Up the long 1 in 276 to Westenhanger we gradually fell to 46 an hour, and most of the descent to Folkestone was taken at about 56. Now for the major part of the distance from Paddock Wood to Westenhanger our veteran was working with the regulator well open, and cutting off at about 30 per cent. ; she was eating coal just as rapidly as *Sir Percivale* had done, with but half the load of the latter ; time was being slowly but surely dropped ; and we had to witness a race, on a descending scale, between her pressure gauge and her water gauge, as we topped Westenhanger with about 90 lb. of steam and an inch of water showing in the glass.

Actually the times were 10 min. 40 sec. from Paddock Wood (passed at 2 m.p.h.) to Staplehurst, 7·1 miles ; 9 min. 35 sec. thence to Pluckley, 8·6 miles ; 6½ min. onwards to Ashford, 5·6 miles ; 11½ min. from Ashford to Sandling Junction, 9·3 miles (this last a gain of ½ min. on schedule) ; 6 min. 5 sec. from there to Folkestone Junction, 5·5 miles ; and 8 min. 55 sec. from the latter to the stop at Dover Marine, 6·0 miles ; total, 53 min. 15 sec., or 51 min. net, from Paddock Wood to Dover, 42·1 miles, as against 48 min. scheduled, which *Sir Percivale*, single-handed, would have kept easily, and probable improved upon. In these happenings the advertisement for the "large" engine needs no stress.

Coming back from Dover the same thing happened. No. 770 was the engine this time, with a load of 363 tons empty, or 380 tons gross. On starting we were content with no more than 140 lb. of steam, but by judicious firing the needle moved steadily upwards, what time we mounted to Sandling, until we had 180 lb. on passing Westenhanger. The gradient throughout is 1 in 264, for 12 miles practically without a break. Except

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on starting, when 40 per cent. was employed, the cut-off was 35 per cent. right up the bank, with the regulator not quite fully open, so that the engine was far from pressed; speed rose very slowly on the climb, reaching 40 m.p.h. at Folkestone Central, 42 at Cheriton, and 43½ at Sandling. On the gentle descent to Ashford, with 27½ per cent. cut-off, and regulator about one-third open, we had just got up nicely to 65 m.p.h. beyond Smeeth, when a string of signal checks heralded a stop at Ashford to do exactly what we had done previously at Tonbridge. From Dover Marine we had passed Folkestone Junction, 6·0 miles, in 13 min. 5 sec.; Sandling Junction, 11·5 miles, in 20¾ min.; and Smeeth, 16·5 miles, in 26½ min.; we stopped at Ashford, 20·8 miles, in 32 min., or about 31 min. net—the latter our booked time to pass.

This time we got a pair of engines in distinctly better condition—No. 156, a Kirtley 4-4-0, piloting No. 725, a Wainwright 4-4-0—but to balance this we were turned to the Maidstone route. Hothfield, 3·4 miles, was passed in 7 min. 10 sec., and Lenham (summit), 10·1 miles, in 16 min. 5 sec.—3 min. less than the booked allowance from pass to pass—while to Maidstone East, 19·2 miles, the time was 26 min. 40 sec. After the severe slack here, the engines were driven rather more easily, but we ran on to Malling, 5·2 miles, in 8 min. 20 sec.; Malling to Wrotham, 5·1 miles, in 6 min. 50 sec.; thence to Otford, 5·6 miles, in 6¾ min.; Otford to Swanley, 6·4 miles, in 8 min. 20 sec.; and Swanley to Bickley Junction, 5·0 miles, in 6 min. 25 sec. From Ashford start to Bickley, therefore, our time of 63 min. 20 sec. for the 46·5 miles was 4¾ min. less than the conditional boat timings, but signal checks and the Catford loop made the remainder of the run into Victoria very slow. Disappointing though this day was, it was not without its interest; and I hope during the coming summer again to try Victoria-Dover on the footplate, and, next time,

Photo.] [*C. Stevens.*

L.N.E.R. 10.20 A.M. NEWCASTLE-KING'S CROSS EXPRESS APPROACHING LOW FELL.

Three-cylinder 4-6-2 locomotive No. 2580.

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without "swopping horses in mid-stream."

By far the best run that I had on the Eastern Division of the Southern last summer was one on the 3.35 p.m. down Hastings express, which I have tabulated separately. Despite a late start of 3½ min., and a signal check between London Bridge and New Cross costing 1½ min., we reached Crowhurst a minute before time, so that the net time was 74 min., or 6 min. under schedule. Of this amount 5 min. were gained between Tonbridge and Crowhurst alone. And this was with a substantial 9-coach corridor formation of 270 tons in all, a load not to be despised over a route boasting lengthy banks at 1 in 100. We ran the 39 miles from Knockholt to Battle in 44 min. 40 sec., at an average of 52·4 m.p.h., despite the severe slack at Tonbridge, and the tremendous climb thereafter to Tunbridge Wells.

S.R. CHARING CROSS-HASTINGS.

Engine: 4-4-0 (large-boilered) No. 763.
Load: 36 axles, 251 T. empty, 270 T. full.

Distance.		Sched.	Actual.	* Speeds.
Miles.		Min.	m. s.	m.p.h.
0·0	Charing Cross..	0	0 00	—
1·8	London Bridge†	5	4 40	25
			sigs.	52
4·9	New Cross ..	9	9 50	—
7·1	Hither Green ..	12	13 10	43½
8·9	Grove Park ..	—	15 50	36
10·2	Elmstead Woods	—	18 20	33
11·2	Chislehurst ..	18½	19 55	40
13·8	Orpington ..	22	23 35	46
15·2	Chelsfield ..	—	25 40	40
16·5	Knockholt ..	26	27 35	37
20·5	Dunton Green	—	32 05	68
22·0	Sevenoaks ..	32½	33 35	54
26·9	Hildenborough	—	38 15	72½
29·5	Tonbridge† ..	40½	40 55	40
32·9	High Brooms	—	46 55	‡31½
34·4	Tunbridge Wells	49½	49 35	40
36·7	Frant	—	52 55	§36½
			—	61½
39·3	Wadhurst ..	56	55 45	‖53
43·8	Ticehurst Road	—	60 20	65
47·4	Etchingham ..	—	63 30	74
49·6	Robertsbridge	68	65 35	¶45
			—	61½
55·5	Battle	76	72 15	47½
57·6	Crowhurst ..	80	75 30	—

* Max. and min. speeds by chronograph at *or near* stations shown. † Service slack. ‡ Min. (twice) between Tonbridge and Tunbridge Wells. § Min. between Tunbridge Wells and Frant. ‖ Several slacks to 60 m.p.h. between Wadhurst and Ticehurst Road. ¶ At Mountfield Siding.

Coming back, No. 765—another of the large-boilered 4-4-0's—did very fairly, also, with a 240-ton train, passing Battle from Crowhurst in 4¾ min., Robertsbridge in 11 min., Etchingham in 13 min. 10 sec., Wadhurst in 25 min. 5 sec., and reaching Tunbridge Wells in 31 min. 5 sec., 2 min. early. Maximum speed was 66 beyond Battle, and minimum up the long 1 in 100-132 to Wadhurst 33 m.p.h. From Tunbridge Wells 1¼ min. were lost on the 8-min. schedule to Tonbridge, by reason of a p.w.r. check, but were recouped in the climbing to Knockholt, allowed 20 min., 35 m.p.h. being maintained on the 1 in 122 to Sevenoaks Tunnel, and 37 on the 144 through the tunnel, while the minimum at Knockholt, after a top speed of 64 an hour at Dunton Green, was 41 m.p.h. Despite signal delays all the way from Orpington to Hither Green, the time from Tunbridge Wells to London Bridge was 49¼ min., or only 1¼ min. over the booked allowance.

Another successful journey was on the 3.15 p.m. from Victoria to Margate—now a nine-coach corridor train of the latest stock, weighing 284 tons empty, and 305 tons full. This means that the engine—invariably a Maunsell rebuild, and in our case No. 749—has, inclusive of its tender, to haul some seven times its own weight over the mountainous grades of the Chatham section. But 7 min. more are allowed to-day for the journey than the one-time figure of 90 min. As always now, the suburban electrified area was taken very slowly, and time was lost by a signal check at Sydenham Hill that brought us virtually to a stand. Up the 1 in 95 to Bickley speed was 30 m.p.h., followed by 64 at St. Mary Cray, 51 at Swanley, 71½ at Farningham, 44 at Meopham, and 66 ere we were braked for a careful descent of Sole Street bank, and a cautious passage of Rochester curve. Speed ranged round 57 m.p.h. at Rainham, touched 66 at Sittingbourne and 69 at Teynham, then falling to 51 before the Faversham slack to 30 an hour. We also touched 60 at Graveney and 69 at Birchington, with an intervening minimum of 47 at Herne Bay. On this run our time of

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SOUTHERN RAILWAY: VICTORIA-MARGATE.

A. Maunsell rebuilt and superheated, S.E. & C. type.

E. Urie rebuilt and superheated, L. & S.W. type.

	Engine, 4-4-0 No.		749A	312E
	Load (axles) ..		36	32
	,, (tons, tare)		284	227
	,, (tons, full)		305	245
Distance. Miles.		Schedule. Min.	m. s.	m. s.
0·0	Victoria	0	0 00	0 00
3·2	Brixton	7½	8 15	6 48
4·0	Herne Hill ..	9	9 30	8 00
			sigs.	
5·7	Sydenham Hill ..	—	14 10	11 35
			p.w.s.	p.w.s.
7·2	Penge	—	17 55	14 28
			p.w.s.	
8·7	Beckenham Jc. ..	18	20 10	16 33
10·8	Bromley South ..	—	23 55	19 35
12·6	Bickley Jc. ..	26	27 10	22 50
13·3	St. Mary Cray Jc.	27	28 15	24 00
14·8	St. Mary Cray ..	27	30 00	25 45
17·6	Swanley	32	33 10	29 00
				p.w.s.
20·5	Farningham ..	—	35 50	32 44
23·3	Fawkham ..	—	38 40	36 11
26·8	Sole Street ..	42	42 55	40 59
32·9	Rochester Bdge.*	50	49 55	47 27
34·3	Chatham* ..	53	52 20	49 20
35·9	Gillingham ..	—	55 00	51 32
38·9	Rainham.. ..	—	59 00	55 01
41·6	Newington ..	—	61 50	57 47
44·7	Sittingbourne ..	65	65 00	60 59
48·0	Teynham ..	—	68 00	64 07
52·0	Faversham* ..	73	72 25	68 48
55·0	Graveney Siding	—	76 25	—
58·6	Whitstable ..	—	80 35	77 10
62·7	Herne Bay ..	85	84 30	81 33
70·7	Birchington ..	—	92 30	90 50
72·3	Westgate ..	—	94 20	93 34†
73·9	Margate	97	96 40	—

* Service slack. † 94 min. allowed to stop.

66 min. 5 sec. for the 59·0 miles from St. Mary Cray Junction to Westgate gave an average speed of 53·6 m.p.h. over this distance, despite the long and severe slack through the precincts of Rochester and Chatham.

In a parallel column with the last run is shown the effort of one of the small-boilered South Western Drummond superheater rebuilds on the same service. The train in this case was the Sunday 10·10 a.m down, allowed 94 min. to Westgate, and the load a considerably lighter one of 245 tons all found. With this train, and despite a severe slack at Sydenham Hill, a much more rapid start was made, the time to Bickley being 4½ min. less than on my run. Speed here was 34 m.p.h., slightly reduced by p.w. operations at Bickley Junction to 30 an hour, after which the rate touched at St. Mary Cray was 61½, and the minimum at Swanley was 44. A long subsequent relay slack hampered the descent to Farningham, which only produced a maximum of 57½ m.p.h., and the lowest rate up Longfield bank was 39 m.p.h. Down Sole Street 67 was touched, and the speed round Rochester curve was considerably above normal. With the time in hand thus snatched, the driver then eased somewhat, only touching 66 an hour at Teynham, and falling to 45 between there and Faversham, where speed was reduced to 38 m.p.h. As to the concluding speeds, 55½ was the best at Graveney and 63½ at Birchington, with a minimum of 36 up Herne Bay bank. Beyond the good start out of London, the South Western engine appears to have had less in hand than his South Eastern relative. This run was recorded by a correspondent.

On the Folkestone trains I was not very happy last summer. I went down specially by a mid-day "semi-fast" in order to get a run to town on the 5.10 p.m. up, and was unfortunate enough unwittingly to choose the day of Folkestone Races. In consequence, my own train was overloaded, and the congestion of the line with specials made matters still worse. We had a ten-coach corridor formation weighing 312 tons empty, and, with a crowded passenger complement, at least 340 tons full; large-boilered 4-4-0 No. 775 was the engine. Accelerating very slowly out of Folkestone, we topped Sandling Junction at 41½ m.p.h., and then gradually worked up to the excellent maximum rate of 69 an hour through Ashford. In fact, in consideration of the load, first-class work was done from Ashford to Tonbridge, with speeds of 61½ m.p.h. before and 67 at Pluckley, and between 62½ and 66 m.p.h. thence to Paddock Wood, the final speed on the 1 in 260 rise before shutting off steam for Tonbridge being 54 m.p.h.

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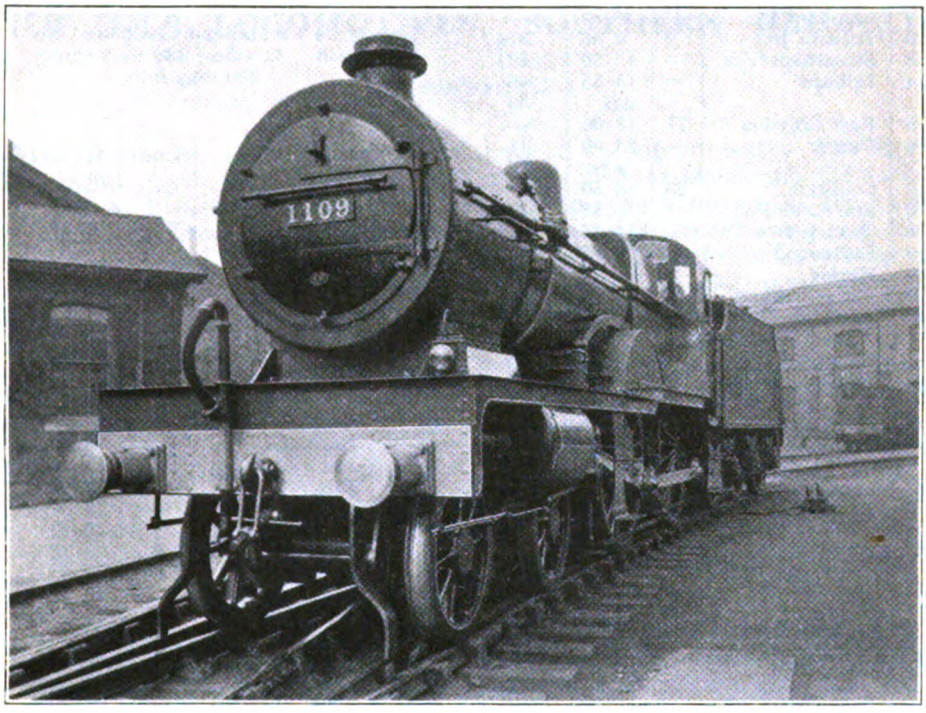
So we passed Sandling Junction, 4·6 miles, in 9 min. 20 sec.; ran the 5·0 miles on to Smeeth in 5 min. 55 sec., and the 4·3 miles thence to Ashford in 4 min.; the 5·5 miles from Ashford to Pluckley in 5 min. 20 sec.; on to Staplehurst, 8·6 miles, in 8 min. 5 sec., and from there to Paddock Wood, 7·1 miles, in 6 min. 50 sec.; while Paddock Wood to Tonbridge, passed very slowly on account of adverse signals, took 5 min. 55 sec. for the 5·3 miles, making 45 min. 25 sec. for the 40·5 miles from Folkestone, and 26 min. 10 sec. for the 26·5 miles from Ashford. But we caught up the hindmost of the race specials on the ascent to Sevenoaks, and made a dreadful run thereafter—the more disquieting to me, as I was bound for Wolverhampton, by the 7·10 p.m. out of Paddington. Ultimately we rolled into Charing Cross at 6.57—27 min. late. How I dashed with my luggage into the station yard, chartered a taxi, flew to Paddington—notwithstanding interminable obstruction in Trafalgar Square—arrived there at 7·9½, and boarded the brake of the 7.10 as it passed the foot of the overbridge stairs on No. 3 platform, is an epic needing more space for its narration than the present article affords!

Ere I leave the Southern, let me mention a brilliant run on the Brighton section behind one of Mr. Maunsell's "River" class 2-6-4 tanks. They have not quite the same reserve of power as the Brighton 4-6-4 tanks, as is only natural, in view of their more limited dimensions, but given reasonable loads, the "Rivers" are exceedingly speedy engines, as my run amply proves. All the relevant details are given in the brief table; the train was the 3.15 p.m. down Eastbourne, the engine No. 799, *River Test*, and the load a 41-axle train of 250 gross tons. Delay was caused in the early stages by our having to take the local road from Croydon to Coulsdon, together with a couple of signal checks, but from Quarry we went like the wind, touching 75 an hour at Horley, and 74 at Hayward's Heath (we should have had another 75 here, but for sighting adverse signals before Wivelsfield), with an inter-



NEW 4-4-0 3-CYLINDER COMPOUND LOCOMOTIVE No. 1109, L.M.S.R.

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vening minimum rate or 53 at Balcombe Tunnel. We gained, in fact, 3 min. from Coulsdon to Keymer. With all checks,

SOUTHERN RAILWAY: VICTORIA-LEWES.

Engine, $\frac{2\text{-}6\text{-}4}{T}$ No. 799 *River Test.*
Load, 41 axles, 236 T. empty, 250 T. full.

Distance.		Sched.	Actual.	*Speeds.
miles.		min.	m. s.	m.p.h.
0·0	Victoria.. ..	0	0 00	—
2·7	Clapham Jc. ..	—	6 50	—
4·9	Balham Jc. ..	9	9 55	37½
6·8	Streatham Com.	—	12 20	52½
9·4	Selhurst ..	—	15 55	46
			sigs.	30
10·5	East Croydon ..	17	18 00	—
13·6	Purley	—	23 00	41
			sigs.	30
15·0	Coulsdon ..	23	25 50	—
17·0	Star Lane Box	—	28 55	41½
18·8	Quarry Box ..	—	31 15	42½
21·9	Earlswood ..	32	34 15	70½
26·0	Horley	—	37 40	75
29·6	Three Bridges ..	40	41 05	60
31·9	Balcombe Tunnel Box	—	43 45	53
34·1	Balcombe ..	—	46 00	65
38·0	Hayward's Hth.	49	49 25	74
			sigs.	30
41·2	Keymer Jc. ..	53	52 55	30
44·8	Plumpton ..	—	58 50	55½
			—	52½
47·7	Cooksbridge ..	—	61 55	60
50·2	Lewes	65	65 35	—

* Max. and min. speeds by chronograph.

the gross time to Lewes was only 65 min. 35 sec., and unchecked I do not fancy we should have taken more than 62 min., although allowed 65 min.

And then, lastly, I want to revert to the London-Birmingham services of the L.M.S., as since writing my last article I have secured an even finer run with a Midland compound than any of those published in last month's issue. The train was the 11.25 a.m. up, which has now been added to the select band of expresses making the Coventry stop within the two-hour timing from New Street to Euston. For a Coventry stop train, too, a load of 250 tons is fairly substantial. To Coventry we lost 2½ min. on the "counsel of perfection" timing of 19 min., but of these at least a minute may be credited to the Adderley Park check. A magnificent start was made from Coventry to Rugby, through which place an unnecessarily severe slack was made to 30 m.p.h. In consequence, a fraction of time was lost from Rugby to Blisworth, but the running from there onwards was peerless.

In particular, the remarkable time of 14 min. 20 sec. from Bletchley up to Tring should be noted, with its average speed of 65·8 m.p.h. from Bletchley as far up the ascent as Cheddington. There was still plenty of steam available, as witness the

L.M.S. BIRMINGHAM-EUSTON.

Engine: 4-4-0 Midland Compound No. 1052.
Load: 32 axles, 236 tons empty, 250 tons full.

Distance.		Sched.	Actual.	* Speeds.
Miles.		min.	m. s.	m.p.h.
0·0	Birmingham ..	0	0 00	—
			p.w.s.	25
1·9	Adderley Park	—	4 10	—
3·8	Stechford ..	—	6 45	—
6·5	Marston Green	—	9 25	67
10·1	Hampton ..	—	12 35	69
13·4	Berkeswell ..	—	15 45	61
15·4	Tile Hill ..	—	17 35	71½
18·9	Coventry ..	19	21 25	—
4·9	Brandon ..	—	6 20	68
10·8	Rugby No. 7†	—	11 40	†37
11·4	Rugby† ..	13	12 50	†30
18·7	Welton ..	—	22 00	‡52½
24·3	Weedon ..	—	27 10	68
31·2	Blisworth ..	33	33 35	—
34·1	Roade ..	36	36 30	59
39·3	Castlethorpe ..	—	40 50	77½
41·6	Wolverton ..	—	42 50	—
47·3	Bletchley ..	49	47 50	69
53·8	Leighton ..	—	53 40	64
57·9	Cheddington ..	—	57 30	60
62·3	Tring	65	62 10	56½
66·0	Berkhamsted ..	—	65 30	—
69·5	Boxmoor ..	—	68 20	—
73·0	King's Langley	—	71 00	80½
76·5	Watford ..	79	74 00	—
80·7	Hatch End ..	—	77 35	—
82·6	Harrow ..	—	79 05	—
			p.w.s.	§20
88·6	Willesden Jc.	91	87 40	—
			sigs.	‖15
94·0	Euston ..	99	95 35	—

* Max. and min., by chronograph. † Service slack. ‡ At entrance to Kilsby Tunnel. § At Kenton; also 30 m.p.h. for bridge repairs below Wembley. ‖ Outside Euston.

maximum of 80½ at King's Langley, beyond which the engine was slightly "eased" for Watford, as she had been pre-

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viously for Castlethorpe troughs. Without the remotest difficulty we should have reached Euston in 91 min. from Coventry—8 min. under schedule—given a clear road, and this is equivalent to a non-stop time of something like 108 min. from Birmingham to Euston. The author of this fine effort was Driver Ward, of Camden shed, and he deserves every credit for the work he got out of his engine, for whose capabilities he had nothing but praise. No more convincing proof could be afforded of the suitability of the compounds for the Birmingham workings, granted that, as in this case, they are handled as efficiently as they have been designed.

NEW 4-4-0 LOCOMOTIVES, SOUTHERN RAILWAY.

(*See* FRONTISPIECE.)

FIFTEEN new 4-4-0 type express engines have been built by the North British Locomotive Co. Ltd., Glasgow, for the Eastern section of the Southern Railway. In general design the engines are duplicate with the "L" class introduced in 1914, but improvements have been made by Mr. R. E. L. Maunsell, the Chief Mechanical Engineer, in various details. The boiler pressure has been increased from 160 to 180 lbs. per square inch, and the cylinder diameter reduced from 20½ in. to 19½ in., so that the tractive effort is not appreciably affected. The Stephenson link motion has been entirely re-modelled and the valve travel increased to 5⅜ in. in full gear, the lap being increased from ⅞ in. to 1 $\frac{3}{16}$ in.

The engines have the "Maunsell" type superheater header with snifting valves and a hydrostatic sight feed lubricator having separate condenser for cylinders and valves. The smokebox arrangement has been re-designed and a standard chimney fitted. The flat-sided tender with enhanced brake power is also duplicate with the 2-6-0 type engines of Mr. Maunsell's design.

Particular care has been taken with the re-arrangement of the cab and footplate, resulting in improvement for the comfort and convenience of the enginemen. The cab roof has been extended backwards, side windows provided and the large tool boxes behind the splashers have been replaced by tip-up seats. The lighting in the cab is excellent and the look-out improved. Such fittings as the vacuum brake ejector, steam reversing gear control and sight feed lubricator have been carefully located in the most convenient positions for observation and operation. Hand sanding gear is provided to each pair of coupled wheels. The Davies & Metcalfe exhaust steam injector is fitted on the left-hand side.

These engines, which are numbered A. 753 to A. 759 and A. 782 to A. 789, are mainly intended for the Charing Cross, Folkestone and Deal, and the Charing Cross and Hastings services.

Barrel dia. out.—	
Front ring	4 ft. 10⅞ in.
Back ring..	5 ft. 0 in.
Barrel length	11 ft. 5 in.
Firebox shell—	
Width	4 ft. 0⅛ in.
Length	7 ft. 5 in.
Tubes, 1¾ in. out. dia. ..	169
Heating surface—	
Firebox	154·5 sq. ft.
Small tubes	914·0 ,,
Large tubes	338·5 ,,
	1,407·0 ,,
Superheater	235·0 sq. ft.
Grate area	22·5 ,,
Cylinders	19½ in. by 26 in.
Coupled wheels	6 ft. 8 in.
Weight of engine (working order)	58 tons 10 cwts.
Weight of tender (working order)	40 tons 10 cwts.

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Death of Mr. E. L. Ahrons.

WE regret to record the death, early on March 30, of Mr. Ernest Leopold Ahrons, M.I.Mech.E., M.I.Loco.E., at his residence, 16, Corporation Oaks, Nottingham. Mr. Ahrons was born in 1866 at Bradford and was educated at the Bradford Grammar School and Yorkshire College, Leeds. At the latter he gained one out of three advanced scholarships in mathematics and physics, and was awarded first prize in engineering construction and mechanism and machinery. From 1885 to 1888 Mr. Ahrons was an engineering pupil at Swindon Locomotive Works, G.W.R., and for the next two years was employed on the drawing office staff there. In 1890 he became Chief Draughtsman to Messrs. Fleming, MacFarlane & Co., Middleton. In 1892 he was appointed to the Ecole Khédiviale d'Arts et Métiers, Boulac, Cairo, where he held the position of Engineer and Manager of the Government Workshops. He resigned this appointment in 1898, owing to ill-health, and on returning to England in that year became engineer-in-charge of the general department of Messrs. Henry Simon Limited, of Manchester. Between the years 1902 to 1917 he held various other positions, and was, during the war, appointed Trade Officer at the Department of Overseas Trade (Development and Intelligence). This post he resigned in 1919. For some years prior to 1919, Mr. Ahrons had been contributing articles to *The Engineer*, THE RAILWAY MAGAZINE, *The Locomotive*, and other technical journals, and since 1919 had devoted himself entirely to literary work, particularly in regard to locomotive history and various aspects of locomotive engineering. His writings proved most acceptable to a wide circle of readers particularly the long series of articles which he contributed to THE RAILWAY MAGAZINE under the general heading of "Locomotive and Train Working in the Latter Part of the Nineteenth Century," commenced in January, 1915, and still in process of publication. He was also the author of several books and primers dealing with locomotive matters.

Photo.] [*Elliott & Fry.*

THE LATE MR. E. L. AHRONS.

Mr. Ahron's articles for THE RAILWAY MAGAZINE have been characterised by the very complete knowledge and keen observation evidenced therein, while he was able to enliven them with many personal reminiscences, affording numerous indications that he possessed a strong sense of humour. The series of articles contributed by him has now very nearly reached its conclusion, and our readers will join with us in regretting that we shall not be able to follow it with the further series which was under consideration. The following is a list of the articles published in THE RAILWAY MAGAZINE under the general heading of "Locomotive and Train Working in the Latter Part of the Nineteenth Century." To anticipate requests for issues which we are unable to supply, we may explain that only the numbers since June, 1924, are still in print, and some of these will not long be available :—

London and North Western	Jan., Feb., March, May, 1915.
Great Northern ..	June, July, 1915.
Manchester, Sheffield and Lincolnshire	Aug., Sept., Oct., 1915.
Great Western ..	Nov., Dec., 1915. Jan., Feb., March, April, May, June, July, Aug., 1916.
Glasgow and South Western	Sept., Oct., 1916.

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North Eastern.. ..	Nov., Dec., 1916. Jan., Feb., March, April, May, 1917.
South Eastern ..	June, July, Aug., 1917.
Lancashire and Yorkshire	Sept., Oct., Nov., 1917.
London, Chatham and Dover	Dec., 1917. Jan., Feb., 1918.
Caledonian	March, April, May, June, 1918.
Great Eastern ..	July, Aug., Sept., Oct., Nov., Dec., 1918.
London, Brighton and South Coast ..	Jan., Feb., March, April, 1919.
Midland	May, June, July, Aug., Sept., Oct., Nov., Dec., 1919. Jan., Feb., March, 1920.
North British	April, May, June, July, Aug., Sept., 1920.
London and South Western	Oct., Nov., Dec., 1920. Jan., Feb., March, April, 1921.
North Staffordshire ..	May, June, 1921.
Highland	July, Sept., 1921.
Furness	Oct., Nov., 1921.
Great North of Scotland	Jan., Feb., March, 1922.
Cambrian	April, May, 1922.
Brecon and Merthyr ..	July, Aug., 1922.
Taff Vale	Oct., Nov., 1922.
Maryport and Carlisle	Dec., 1922.
Rhymney	Feb., March, 1923.
Barry	May, June, 1923.
Midland and Great Northern Joint	Aug., Sept., 1923.
Midland and South Western Junction	Nov., Dec., 1923.
Somerset and Dorset Joint	Feb., March, 1924.
North London ..	June, July, 1924.
Hull and Barnsley ..	Sept., Oct., 1924.
Metropolitan and Metropolitan District	Dec., 1924. Feb., 1925.
Great Southern and Western of Ireland	April, May, June, Aug., 1925.
Waterford, Limerick and Western	Oct., Nov., 1925.
Dublin, Wicklow and Wexford	Feb., March, 1926.
Midland Great Western of Ireland	April, 1926.

S.R. 4-6-4 EXPRESS TANK ENGINE No. 329B, "STEPHENSON."

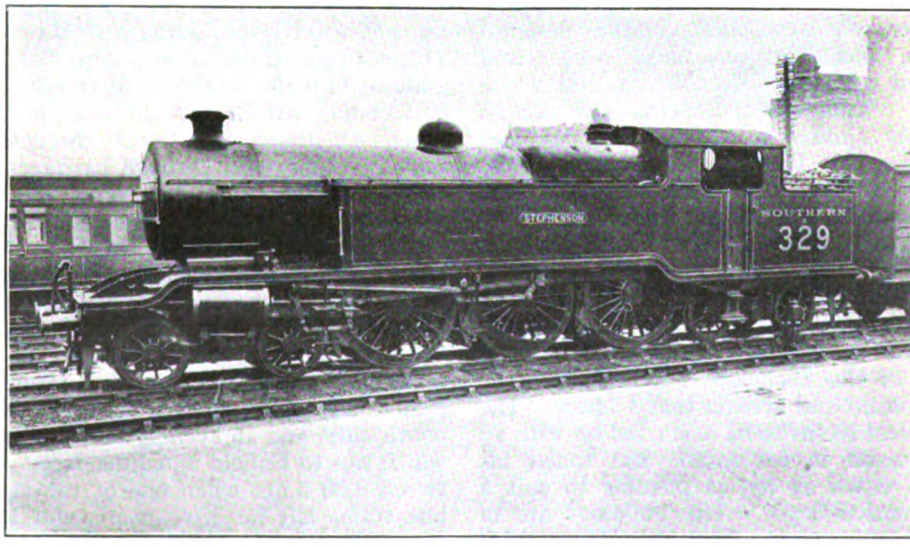

Photo.] [*O. J. Morris.*

The photograph reproduced shows the engine as now running, painted S R. green, and with brass nameplates fixed to the side tanks.

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Locomotive and Train Working in the latter part of the 19th Century.

THE MIDLAND GREAT WESTERN RAILWAY, IRELAND. [II.]

By the late E. L. AHRONS, M.I.Mech.E., M.I.Loco.E.

THE locomotives presented a much more uniform appearance than those of the Dublin, Wicklow, and Wexford Railway. The chimneys were long and had a very wide bell mouth at the top; the domes were of the plain round-topped pattern, and most of the safety valves, placed above the firebox casing, had painted covers. The front handrail passed over the smokebox immediately in front of the chimney. The cabs were of a peculiar curved pattern turned upwards at the back, and not unlike some of the earlier cabs of the 1860 period on the Caledonian Railway. The numbers were plain brass block figures, which in the case of the passenger engines were fixed on the driving splashers, and in that of the goods engines on the rectangular sandboxes in front of the driving splashers. The name plates were rectangular with raised brass letters and were fixed on the boiler beneath the dome. The engines were painted bright emerald green, including the underframes, and picked out with black bands and white lines. This colour scheme was almost exactly similar to that of the Midland Railway of England during the 1875–1884 period. The background of the nameplates was bright vermilion. The dateplates were usually placed on the sides of the cabs.

The locomotive works and running sheds at Broadstone are situated immediately outside the station, and except perhaps part of the Inchicore buildings, are the most solid and artistic that I know. The architect seems to have started off with an old castle in his mind, and toned his ideas down as far as possible to suit a locomotive depot. The buildings are of rough grey stone, with picturesque windows, the walls being covered up to a line half way up with carefully trimmed ivy.

There always appeared to be a very large number of engines stabled at Broadstone running shed, at least there were on the occasion of my visits. Once I found more than 40 engines there, though the number of trains to depart from Dublin at that time did not exceed 18, including both passenger and goods. There were, of course, three or four engines required for shunting and general duties, in addition to the main-line engines, but the net result appeared to be that nearly one-third of the total stock of locomotives on the line was to be found in Broadstone shed, and this did not include engines waiting for repairs. I have walked straight over from Broadstone to the Amiens Street shed of the Great Northern and found less than half-a-dozen engines there, the difference probably being that much of the traffic on the latter line was then worked by engines from Dundalk.

Broadstone station was an imposing but not a lively spot. In 1889, there were 11 passenger trains which departed, beginning with the limited mail at 7.40 a.m. and ending with the night mail at 7.30 p.m. Of these, four went through to Galway, some with through carriages for Sligo. A fifth main line train was the 1.0 p.m. slow train to Athlone, where it terminated, and another went to Mullingar, where it branched off to Cavan. Three slow trains were for the Meath lines, two going through to Kingscourt and the third terminating at Navan. The two remaining trains were in the nature of locals, an early morning one for Maynooth only, and an evening business train, which ran to Enfield and Edenderry. Between 9.30 a.m., when one of the Meath line trains left for Kingscourt, and 12.30 p.m., when another departed for Navan, there was a three hours' break, and an interval of similar duration occurred between the departure of the 1.0 p.m.

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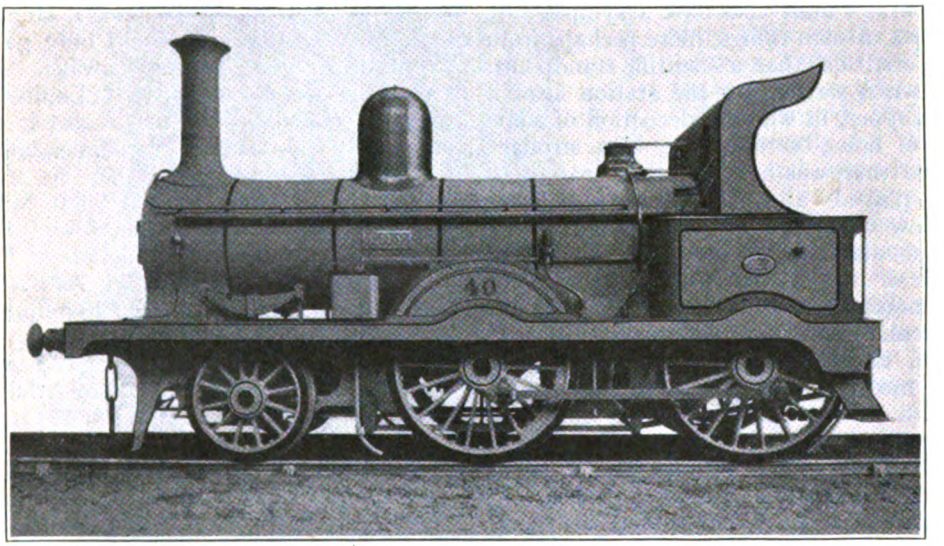
Athlone slow and a Galway and Sligo train at 4.0 p.m.

There were seven main-line goods trains from North Wall beginning with one at 6.0 p.m. for Galway, followed by the 8.0 p.m. for the Mayo line and Ballina, and the 10.0 p.m. for Sligo. At 11.30 p.m. the second Galway goods departed, and at 1.0 a.m. and 3.0 a.m. there were trains for Cavan and Kingscourt respectively. The last "night" goods left at 4.15 a.m. for the Mayo line and Westport. There were corresponding up goods trains for Dublin, most of which were usually to be seen strolling down the incline into North Wall about breakfast time. On the country lines there were a number of mixed passenger and goods trains, and the early-morning 6.0 a.m. main-line slow train from Galway to Athone, was of this description, the 48½ miles requiring 2 hrs. 35 min. for the journey. The instructions for working such mixed trains were that the engine and guards' van brakes were to be applied as nearly as possible simultaneously. The driver gave three short sharp whistles just before putting on the engine brake, and on hearing them, the guard immediately applied the van brake. As a signal for taking off the brakes the driver gave one short whistle.

My first acquaintance with the Midland Great Western Railway was made in the late "eighties" in company with O'Rourke who acted as cicerone, and did other things as well. In the latter connection, Athlone once became a centre of astronomical activity, at least for a very short time. It was mostly the fault of O'Rourke's aunt, who resided in that neighbourhood, and had invited us down there for two days. Had it not been for this, the science of astronomy might have languished in that district, which would have been a pity. As it was, it certainly throve there for at least one night, to my own knowledge, and since some of the railway company's properties did duty for the observatory, I may as well record the manner of its thriving.



M.G.W.R. 2-4-0 LOCOMOTIVE No. 40.
Coupled wheels, 5 ft. 8 in. diam.

The original programme was that we were to go down by the early-morning "Limited" from Broadstone, and return by the night mail the next day. The down "Limited," like most of these things in Ireland, started at an unconscionably early hour in the morning, and as it was a long way from the south side of Dublin to Broadstone station, and O'Rourke was not an early riser, we missed it by about five minutes. Fortunately, there was the "fast" at 9 a.m., so we consoled ourselves with this and the reflection that there would be no extra fares to pay, and in

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the meantime we went round the engine shed. My companion invested in a *Freeman's Journal*, and after reading it for a time in the train, passed it over to me, his finger indicating a paragraph which announced the forthcoming appearance on the evening of the next day of an eclipse of the moon, partially visible in Ireland. "We shall be driving back to the station at about that time, and ought to see it well," said he. Eclipses are somewhat out of my line, but remembering that on occasions he had in conversation dabbled with the heavens in a dilletante sort of way, I obligingly agreed to assist in looking at this one, when it came along.

The next evening it appeared that O'Rourke's aunt also took a sympathetic interest in such things, more perhaps from a superstitious than a scientific standpoint, and when we left for the station after a late supper, in which a decoction of some sort of home-brewed wine, of a stronger nature than was immediately apparent to me, played a considerable part, her nephew wheedled out of her the loan of a binocular field-glass. I do not know much of the merits of field-glasses for astronomical purposes, the *rôle* of this particular pair, as I was given to understand, having hitherto been confined to race meetings and in assisting to sight hounds which had floundered into the wrong bog.

At the station, where we had to wait a considerable time, I noticed with astonishment that O'Rourke showed distinctly increasing signs of exhilaration, the effects of the eclipse, then in full blast, having evidently been assisted by those of the home-brewed decoction. Then he disappeared completely, and a few minutes before the mail train was due was not to be found. As missing the night train would have involved awkward complications, I organised a search party by enlisting the services of the only porter I could find. In a short time the search party returned with a grin and reported that the missing individual was "lanin aginst the signal post beyant the other end of the platform." A hurried visit to the spot revealed O'Rourke in a state of confused happiness with his back propped up against the post staring at the sky through the field glass—reversed. All that I could get in reply to my expostulations was: "Never mind, my boy, it's a blessed foine c-comet!"

We just caught the train, O'Rourke being propelled in with the assistance of the search party. The next day I remarked scathingly that no Irish astronomer ought to be so easily overcome by rhubarb wine. "Rhubarb wine," he retorted, "I've been at my aunt's before, and she makes jolly good punch, but *you* got hold of the wrong jug."

The night mail mentioned above must not be confused with the up "limited mail," which was an afternoon train of much superior calibre. I need not describe the former, beyond remarking that it was then a thoroughly uncomfortable train by which to travel, since it stopped so frequently that one could only go to sleep in it by keeping awake. But something may be said of the "Limiteds," the best trains on the line; this is not necessarily a strong recommendation, though they were faster than in 1880. In 1889 the down "limited" left North Wall at 7.5 a.m., and was towed into Broadstone from Liffey Junction at 7.20 a.m. Leaving Broadstone at 7.40 a.m., it ran to Enfield, 26½ miles, in 46 minutes; average speed, 34·6 m.p.h.; thence to Mullingar, 23¾ miles, the speed was 40·7 m.p.h. From Mullingar to Athlone, where it was due at 9.53 a.m., the 27¼ miles run was done at the rate of 37·2 m.p.h. This section, mostly downhill, could have been covered in considerably less time, though allowance has to be made for the slack to 12 m.p.h. over the Shannon Bridge. The steeply-graded uphill single line stretch of 9⅞ miles from Ballinasloe to Woodlawn was done in 19 minutes at 31 m.p.h., but the weight had been reduced by the detachment of one or two carriages at Athlone. The downhill single line run of 12 miles from Woodlawn to Athenry took 20 minutes, the speed being 36 m.p.h., and the train finally arrived at Galway at 11.30 a.m. But beyond Mullingar the Sligo portion of the train was equally good, if not better, for it ran 84 miles, of which about 53 were single line, in 2 hrs. 31 min., with six stops, and arrived at Sligo, nearly 8 miles further from Mullingar than Galway, in only 10 minutes' more time. The run of 26 miles over the double line from Mullingar to Longford was done at the

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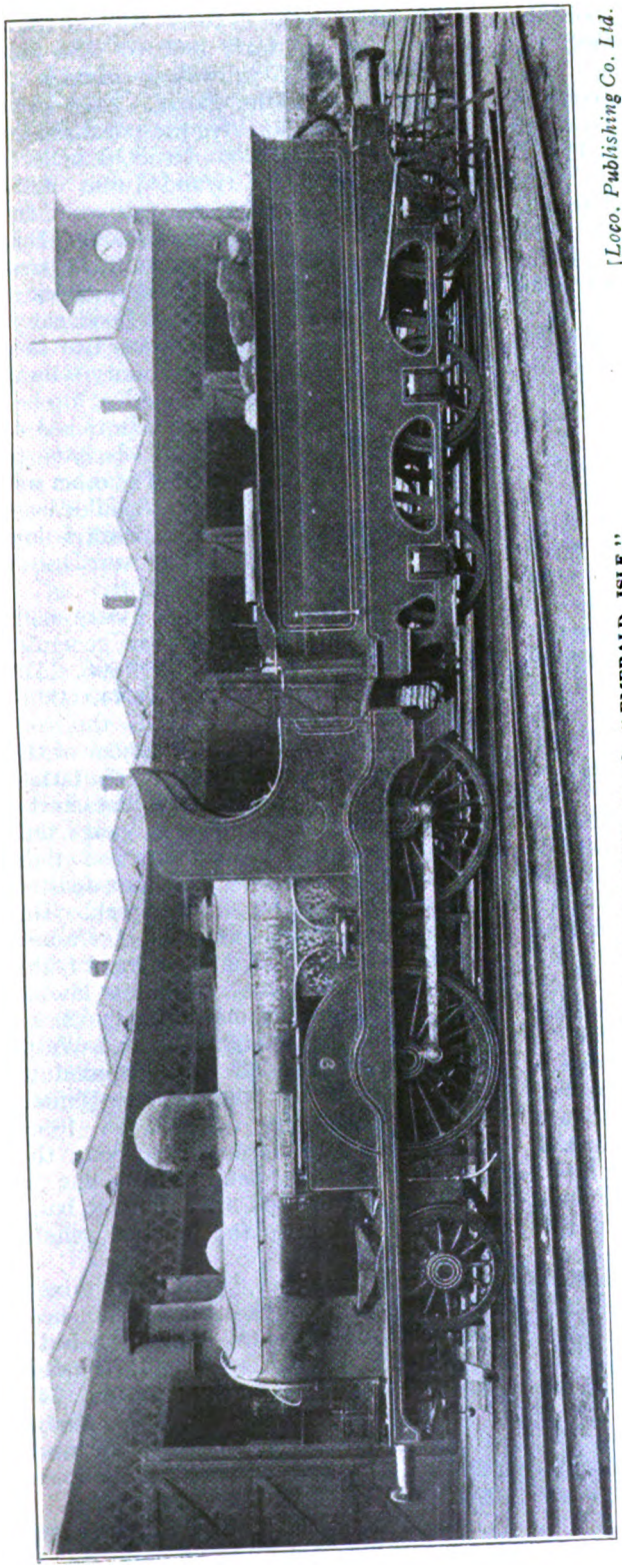

Photo.] [Loco. Publishing Co. Ltd.

2-4-0 LOCOMOTIVE No. 9, "EMERALD ISLE."

Built at Broadstone Works, 1890. Coupled wheels, 6 ft. 3 in. diam. Cylinders, 17 in. by 24 in.

rate of 38 m.p.h. The Mayo lines portion of the train run from Athlone to Ballina, 87¾ miles, of which only 18 miles were double line, in 2 hrs. 49 min., with six stops.

The up mail left Galway at 2.20 p.m., and was joined at Mullingar by a portion which departed from Sligo at 2.12 p.m. The average speeds between stations from Athlone to Dublin were identical with those of the down train. The maximum station-to-station speeds on the whole line were those of the two runs between Enfield and Mullingar at 40¾ m.p.h.

The Limited Mails were run primarily for the Post Office, and secondarily for the benefit of travellers to and from England. Only first and second-class passengers were carried at extra fares, though the additional charges were not excessive, being 2s. 7d. first-class and 1s. 4d. second-class between Dublin and Galway. Passengers in those days were allowed to board these trains "only on condition that there was room." It was also proudly announced that they were fitted with cord communication with a whistle on the engine and a bell in the guard's van. What happened when a passenger pulled in the line and found the bait gone was not stated.

In 1883 the M.G.W.R. began to turn out new 2-4-0 passenger engines from Broadstone Works, the first, I believe, being No. 42. There were 12 of these built 1883-87, six of which were named as under :—

1 *Orion.*	6 *Vesta.*
4 *Venus.*	41 *Regal.*
5 *Mars.*	42 *Ousel.*

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The remaining six, Nos. 43 to 48, bore the same names as their predecessors, the Hawthorn "singles." This class had 16 by 22 in. cylinders, 5 ft. 8 in. coupled wheels, 3 ft. 9 in. leading wheels, coupled wheel base 7 ft. 11 in., total 14 ft. 11 in.; firebox heating surface, 96 sq. ft. total 914 sq. ft., 130 lb. pressure, total weight in working order, 33 tons 17 cwt. The six-wheeled tenders carried 1,600 gallons of water, and weighed 22 tons 5 cwt. fully loaded.

There were also four engines of very similar dimensions by Kitson Company, 1886:—

35 *Airedale.*	39 *Hawk.*
38 *Eagle.*	40 *Lily.*

The above class was used on the main line and also on the long Sligo and Mayo lines, until a larger class with 17 by 24 in. cylinders appeared in 1889. From about 1883, I think the main-line engines began to run through between Dublin and Galway.

In 1885 the "standard goods" engines of the 0-6-0 type began to appear from Broadstone Works. Some of them may have contained parts of the older 0-4-2 and 0-6-0 goods engines, but they seemed to me to be almost, if not entirely new, and were certainly larger engines. All of them were alike and had 5 ft. 3 in. wheels and 18 by 24 in. cylinders, with the standard wheelbase of 14 ft. 11 in., which was then common to nearly all the M.G.W.R. engines, both passenger and goods. The total heating surface was 1,065 sq. ft., and the weight in working order about 38 tons. From 1885 to 1895 no less than 52 of these engines were built, Nos. 55 to 95 and 104 at Broadstone Works, Nos. 130 to 134 by Sharp Stewart & Co., Glasgow, 1895, and Nos. 135 to 139 by Kitson & Co., Leeds, also in 1895. No. 104 was afterwards renumbered 140.

All engines from about 1883 until the end of the century had somewhat old-fashioned tenders with the springs inside the frames, a type which was at one time common on the Great Northern and Lancashire and Yorkshire Railways, but had long before been discarded on English lines, owing to the difficulty in getting at the springs when broken.

The locomotive superintendent during the period with which I am dealing was Mr. Martin Atock.

The additions made to the Midland Great Western system from 1890 to 1895 were so-called "light railways," though of standard 5 ft. 3 in. gauge. They came under two different categories, of which the first were branches constructed under a guarantee from the Grand Juries of the counties in which they were situated, and confirmed by an Order in Council. This, in plain language, meant that the interest on the capital expended and any deficit in the working had to be made good out of the county rates. There were two such branches, of which that in County Galway between Attymon and Loughrea, opened in 1890, has already been mentioned as the third of the three branches lying to the south of the main line. The other was a branch in County Mayo, 13 miles long, opened in 1892 between Claremorris and Ballinrobe. These branches were leased to and worked by the M.G.W.R.

The other "light railways" were made under the Railway (Ireland) Act, generally known as the Balfour Act of 1890. The Treasury granted the sum of £440,000 to the railway company towards the construction of the lines, the remainder of the capital required being found by the latter. This arrangement enabled the lines to be made of the standard 5 ft. 3 in. gauge, and of much more solid construction than ordinary light railways, and also assisted in providing the working stock. The three railways made under this Act were: (1) An extension, 8 miles long, of the existing Manulla Junction–Ballina line to Killala, opened in January, 1893; (2) an extension of the Manulla Junction–Westport line to Achill, 27 miles, opened in 1894–95; and (3) the Galway–Clifden line, 49 miles long, opened in 1895. Galway being a terminal station, the junction with the new Clifden line is outside, and trains to Clifden have to back out of the station to the junction, where they reverse.

To work passenger, goods and mixed trains over some of the shorter branches, a new class of 0-6-0 tank engine was built in 1891–93, having 4-ft. 6-in. coupled wheels, 15 by 22-in. cylinders, and 740 sq. ft. of total heating surfaces. These were Nos. 106 to 117, of which nine were built by Kitson & Co., and three (Nos. 109 to 111) by Sharp, Stewart & Co.

Two enlarged classes of 2-4-0 passenger

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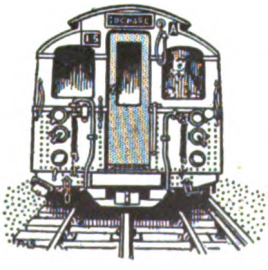
engines were built at Broadstone from 1889 until the end of 1898. The first of these had 6-ft. 3-in. coupled wheels and 17 by 24-in. cylinders, and were intended for the faster main-line trains. Of these, Nos. 7 to 12 had the same names as the earlier and smaller engines with these numbers, and probably contained parts of the motion of the latter, but the frames must have been new, at least in part, since the wheelbase was slightly longer than that of the older engines. The other class was generally similar, but had 5-ft. 8-in. wheels. Of these, Nos. 13 to 24 and 30 to 34 preserved the R, S, and A names of the earlier engines by Neilson and Dübs. There were three completely new engines in the class—No. 27, *Clifden*, No. 28, *Clara*, and No. 29, *Clonsilla*—all built in 1897. The total heating surface of both classes was 1,115 sq. ft.

The carriages used on the principal trains were six-wheeled with compartments. They were painted brown of a shade not unlike that of the old Great Eastern stock, but the titles and numbering were in very small letters and figures. There were no bogie carriages until 1900, when four tri-composite coaches, 53 ft. long over headstocks, were put into service.

It was not until about 1897 that any alteration was made in the times of the limited mails. The down train was then altered to leave Broadstone at 7 instead of 7.40 a.m., and the up train left Galway at 3.10 instead of 2.20 p.m. The journey speeds were five minutes longer in each direction, owing to the allowance for the Athlone stops being increased from five to ten minutes. The station-to-station speeds throughout remained unaltered.

The first sign of the coming change in the locomotives and rolling-stock appeared in 1900, when some of the 2-4-0 engines, originally built in 1880 by Beyer, Peacock & Co.—No. 37, *Wolfdog*, No. 36, *Empress of Austria*, and No. 2, *Jupiter*—were completely rebuilt as 4-4-0 engines with 5-ft. 8-in. wheels, but retaining the old 16-in. by 22-in. cylinders. These were the first 4-4-0 engines on the line, and No. 37 was painted dark blue instead of the former emerald-green colour. Subsequently the blue colour was adopted for the locomotives and blue with white panels for the carriages, but these colours were afterwards abandoned after a trial of a few years during the present century.

The limited mails were not accelerated until 1902, and in this respect the Midland Great Western was a long way behind the Great Southern and Western and Great Northern Companies. But, unlike these, it had no large centres of population, such as Cork and Belfast, at the termination of its line. In 1902 the Enfield and Oranmore stops were cut out, and the down mail which left Dublin at 7 a.m. reached Galway at 10.35 a.m., a gain of 16 minutes in the running time. The up train, which now left Galway at 3.40 p.m., gained 20 minutes. The best runs of the down train were now 39·7 m.p.h. for the 50¼ miles from Dublin to Mullingar, and 43 m.p.h. between Mullingar and Athlone (27¼ miles). The running speeds of the up train were 40·9 m.p.h. from Athlone to Mullingar, and 40·7 m.p.h. thence to Dublin. Larger 4-4-0 engines with 6-ft. 3-in. coupled wheels and 18-in. by 26-in. cylinders were specially built for these accelerated services.



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Chief Officers of the Northern Railway of France.

IN the course of Lord Monkswell's article on the Northern Railway of France, published in the March and April numbers of THE RAILWAY MAGAZINE, reference was made to certain chief officers, and, by courtesy of Monsieur P. E. Javary, Directeur de l'Exploitation, we are enabled to give portraits of himself; Monsieur A. Moyrand, Manager; Monsieur L. A. Brévillé, Chief Mechanical Engineer; and Monsieur F. Tettelin, Engineer; together with biographical particulars.

Monsieur P. E. Javary, "Directeur de l'Exploitation," of the Chemin de fer du Nord, was born in Paris on March 31, 1866, entered the Ecole Polytechnique in 1885, and passed out in the Ponts-et-Chaussées Division in 1887.

After passing some years in the Administration of Ponts-et-Chaussées, he entered the service of the State Railways in 1894, and was, in 1897, summoned to the Nord by Monsieur Albert Sartiaux, the manager, whose close collaborator he soon became.

He was engaged in this manner, with the rank of Engineer-in-Chief of the Central Service, when war broke out.

Monsieur Javary's energy and personality at once made themselves felt in the work of adapting the railway to the military task that was thus thrust upon it. So when, in 1917, Monsieur Sartiaux was obliged to retire on account of ill-health, Monsieur Javary was clearly marked out to be his successor (February, 1917).

Conditions at that time were at their most critical stage, with two-thirds of the system held by the enemy, when the issue of the immense battle that was proceeding on the French front largely depended upon the efficiency of the railway service.

In 1918 the French Government awarded M. Javary the insignia of Commander of the Legion of Honour (Military Division) and published the following Order of the Day with regard to him:

"An organizer of the highest attainments, he has, by his activity and energy, produced from the Nord system results which have surpassed all expectations."

Then after the victory he was cited in an Army Order as follows:

"He undertook during the whole campaign the most overwhelming task. First of all he seconded, with the greatest efficiency, the Technical Commissioner of the Nord system at the time of the battle of the Marne and the race to the sea. Later, called upon to replace this latter, he never ceased to derive from an unshakable faith in eventual success, an unchanging ardour which enabled him to parry the repeated blows struck by the enemy at the Nord system. He was able immediately to find and straightway to apply the measures requisite for re-establishing the working of traffic at the most critical junctures; always present himself at the point which was most threatened he was able by his energy and his profound knowledge right up to the day of the Armistice to put at the country's disposal a railway system equal to every requirement and staffed by men on whom perfect reliance could be placed."

M. Javary has continued in the peace this effort that he made in the war—in reconditioning the railway which was left in a state of complete devastation by the rout of the enemy and by their uncivilized destructiveness.

M. Javary's post-war activities have been characterized by the rapidity of this reconditioning, by the breadth of his views as regards the future, by his contribution to the rebirth of the reconquered territories and by the admirable impulse which he has given to welfare work for the benefit of the railway servants.

In August, 1923, the French Government appointed M. Javary Grand Officer of the Legion of Honour, and in May, 1924, the Board of Directors of the Chemin de fer du Nord gave him the title of "Directeur de l'Exploitation."

M. Javery was president of the Conference of Managers of the Great French Railway Systems for 1925. He is C.B.E.,

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MONS. P. E. JAVARY,
Directeur de l'Exploitation.

MONS. A. MOYRAND,
Manager.

MONS. L. A. BRÉVILLÉ.
Chief Mechanical Engineer.

MONS. F. TETTELIN.
Engineer-in-Chief of Maintenance.

CHIEF OFFICERS OF THE NORTHERN RAILWAY OF FRANCE.

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and holds several other decorations, both French and foreign.

Monsieur Moyrand, Manager of the Chemin de fer du Nord was born at Grenoble on June 13, 1874, entered the service of the railway in 1897 and rose rapidly in that service.

In April, 1917, he became the close collaborator of M. Javary when this latter succeeded M. Sartiaux as manager, and in May, 1924, when M. Javary was promoted "Directeur de l'Exploitation" succeeded him as manager.

During the war M. Moyrand, in intimate collaboration with the Military Commissioner of the Nord system, took an important part in the adaptation of the railway to military needs and in the organisation of the transportation service required by the armies in the field. The French Government, in recognition of his services, awarded him in January, 1919, the Cross of the Legion of Honour (Military Division).

After the war he did much to restore the railway services. From 1924, when he was appointed manager, he has given special attention to technical improvements in the working of the railway and to the development of traffic both French and international.

In 1923 he received the Cross of Officer of the Legion of Honour. He is also C.B.E. and holds several other foreign decorations.

Monsieur L. A. Brévillé, Chief Mechanical Engineer of the Chemin de fer du Nord, was born in 1864, and on leaving the École Polytechnique entered the service of the railway in 1886. Passing through the various grades he became in 1910 Engineer-in-Chief of the Traction Department. During the whole period of his service in this department M. Brévillé took a very active part in the acceleration of trains that was continually being effected and in the increase of their weight.

In November, 1917, M. Brévillé was appointed Assistant Chief Mechanical Engineer and in March, 1918, Chief Mechanical Engineer. He took over the duties of this latter post at a particularly critical time when the railway was about to be called upon to put forth a tremendous effort in preparing the great Allied offensive which was to finish the war. After that he had to re-establish the locomotive depots and workshops demolished by the enemy and repair the engines and rolling-stock which had suffered so severely in the war.

In 1924 he put into service the new series of four-cylinder compound locomotives of the "Pacific" type fitted with superheaters (Nos. 3.1201—3.1240) and in 1925 a completely new type of all-metal vehicle for express trains of great resistant strength.

M. Brévillé is Officer of the Legion of Honour and C.B.E.

Monsieur François Tettelin, Engineer of the Chemin de fer du Nord, was born at Roubaix on September 12, 1865, and passed through the École Polytechnique between 1885 and 1887. He then joined the Engineer's Department of the Chemin de fer du Nord and passed through the various grades, becoming in 1913 Engineer-in-Chief of Maintenance. In this capacity he served throughout the war and till 1921, when he succeeded Monsieur Aumont as Engineer.

Nothing can show more clearly the difficulties he had to face during the war and the masterly way in which he overcame them than the citation which accompanied his appointment as Chevalier of the Legion of Honour in January, 1915. It was as follows:

"In the capacity of Engineer-in-Chief of Maintenance, he rendered exceptional services from the outset of mobilisation. Subsequently he directed with great ability and tireless energy the work of repair, closely following in the footsteps of the retreating enemy; in this way he opened the way for strategic transport at the moment when it was most required."

He continued without wavering to display untiring effort and remarkable tenacity of purpose not only during the war but also during the reconstruction of the devastated railway system and in this way became the subject of another most gratifying citation when he was promoted Officer of the Legion of Honour in 1922. The citation ran as follows:

"First as Engineer-in-Chief of Maintenance and then as Engineer of the Chemin de fer du Nord he personally gave an altogether remarkable impulse to the reconstruction of permanent way and works destroyed by the enemy; in this way he accelerated the resumption

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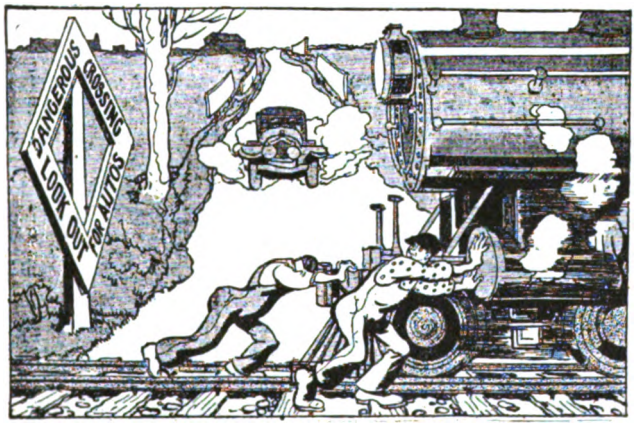
of industrial activity in the devastated regions; by employing new methods of construction he obtained results greater than could have been hoped for."

With these qualities of leadership so brilliantly established M. Tettelin unites sound methods and a watchful disposition which have enabled him to follow up closely the progressive improvements that are taking place in matters of construction and maintenance of way and works and to modernise in a remarkable manner the equipment of the Nord railway system.

A HUMOROUS VIEW OF THE LEVEL CROSSING PROBLEM.



A recent issue of the *New York American* contained the above cartoon under the heading of "As the Autoist Likes It." The engine of a freight train is shown stalled half-way over a level crossing. A motor-car is approaching, while the driver and fireman are frantically endeavouring to push the engine back, with the remark from the driver: "For the love of Pete, shove! Here comes an auto.!" The usual "Stop, Look and Listen" warning board bears the inscription: "Dangerous Crossing, Look Out for Autos."

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Railway Magazine *readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning "British Locomotive Practice and Performance" may be addressed to Mr. Cecil J. Allen, c/o* Railway Magazine, *33, Tothill Street, Westminster, London, S.W.1. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book" (5s. net) should be consulted. The twenty-eighth Annual Edition* (1925) *of this standard railway reference work is now published. All previous Editions are out of print.*

Anglo-Scottish Train Services.

The fact that early morning trains from Euston, St. Pancras, or King's Cross provide a fairly good service from London to Glasgow and/or Edinburgh occurs more or less fortuitously, as these trains are required to run for early morning traffic from London to the Midlands and there join up with trains from Liverpool, Manchester, Leeds, &c., which make morning services from those towns to Scotland at about the same time as the London trains leave their respective termini. In the opposite direction the early morning trains are run for more local purposes, and presumably, there is no need for corresponding connections with trains from the Midlands to London. It may be that the photographer responsible for the illustration to which you refer had incorrectly indicated the train in question. We have not sufficient local knowledge of the station concerned to judge whether you are right or wrong. There are, however, many instances where a southbound express is, at a particular place, travelling more or less in a northward direction, so that the direction of the sun is not, in itself, necessarily a controlling factor

[Reply to C. A. McLaren.]

Work of S.R. "King Arthurs."

Mr. Allen's selection of subject-matter must necessarily be governed by several factors, and he does not profess to deal in any particular issue with the "topic" of the moment, particularly if he himself is not able to make the required journeys at the time, or, as he explains in this issue in regard to King Arthurs on the Eastern Section, S.R., his attempt to meet requirements in this respect has been rendered "null and void" by untoward circumstances. We do not understand why you and one or two other readers should regard the description of an exceedingly interesting industrial railway, as given in our February number, out of place in these pages. Railway working involves very much more than high-speed express train running, and we regard such articles, together with many others we publish, as both interesting and instructive. As a rule, though we have occasional adverse criticisms, such as your own, we could generally quote a dozen letters expressing appreciation for our taking the opposite point of view.

[Reply to R. S. J.]

Locomotive Comparisons.

In default of actual tests it is impossible to say how a G.W. "Castle" would deal with a 450-ton train between Carlisle and Glasgow (Caledonian route) or between Perth and Inverness on the Highland section. If weight and other restrictions

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permitted there is no reason to anticipate any shortcomings in this respect, but whether the design would be a suitable one is another question altogether. The former route includes both hard pulling and fast running, but the latter is not a high-speed route and would not call for an engine of the class in question. Usually locomotives are designed with a view to the special characteristics of each railway system, and not of one or two routes only. In any case it is futile to raise hypothetical questions as to whether alternative designs would not be more suitable, as the factors concerned, and which are often very different from those imagined by outside observers, have usually been taken fully into account by the officers responsible.

[Reply to E. JOSLIN.]

L.N.E. (G.C.) Routes to the North.

Reference to the map published in *The Railway Year Book*, and to articles published in THE RAILWAY MAGAZINE from time to time, will show that the late Great Central Railway made use of the Metropolitan line (now joint L.N.E. and Metropolitan) from Harrow to Quainton Road as one main route, and of the joint Great Central and Great Western line from Northolt through High Wycombe, some expresses travelling one way and some the other. Certain trains require to take one route if they are booked to call at Aylesbury or High Wycombe, but others take whichever is convenient. Thus, the 3.20 p.m. from Marylebone travels via Aylesbury, and the 6.20 p.m. via High Wycombe. It is by no means improbable that connections will eventually be given from Watford to Rickmansworth with semi-fast Great Central section trains, and it may be that through coaches to the north will be introduced if and when there is justification therefor.

[Reply to B. K. COOPER.]

Signalling on the Metropolitan Railway.

Reference was made last month, and in "Pertinent Paragraphs" in the present issue, as to the new signalling introduced on the "widened" lines of the Metropolitan Railway. The signalling is automatic, except where signal-box control is required for junction purposes. The yellow signals are, as usual on the London "Underground" lines, repeaters and not true distants, in that they repeat the indication of the first signal ahead and do not indicate that the way is clear through a series of signals, as usually associated with a particular cabin. The letters and figures placed on the various signals indicate the official numeration, for reference purposes, of each. Nottingham Joint station was described in THE RAILWAY MAGAZINE, dated December, 1900, an issue long since out of print. A new article is, however, in hand, and will be published shortly.

[Reply to W. E. M., NOTTINGHAM.]

Battersea Bridge Terminus.

The site on the south side of the Thames adjoining Grosvenor Road Bridge, was the original terminus of the West End of London and Crystal Palace Railway, incorporated in 1853 and opened to Battersea terminus March 29, 1858. A temporary station was erected instead of the big terminus, the latter being rendered unnecessary by the incorporation of the Victoria Station and Pimlico Railway, which extended the line across the river, and was opened October 1, 1860. But as the L.C. and D. Railway western extension (Strood to Bickley) was not opened till December 3, 1860, it will be seen that the L.C. and D. Railway never used the Battersea terminus of the W.E.L. and C.P. Railway, although the L.B. and S.C. Railway did from March, 1858, to October, 1860.

[Reply to V. W. O.]

Alternative Routes, S.R. (S.W. Section).

We do not know why you should single out the line between Basingstoke and Winchester Junction for your hypothetical query as to what alternative routes would be available in the event of a mishap resulting in a prolonged blockage. In every direction the Southern is better provided with alternative routes, in such emergencies, than almost any other of the British railways; in this particular case trains could travel to Southampton *via* Whitchurch and Romsey, or *via* Alton, or even *via* Guildford, Havant and Fareham. So far as we can trace, however, there are portions of all these routes from which the large 4-6-0 engines would be debarred, *i.e.*, Whitchurch - Fullerton Junction

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Brookwood-Winchester (*via* Alton), and Fareham-Southampton (*via* Netley).

[Reply to "ALLEYNIAN."]

Tractive Effort.

Tractive effort is the maximum theoretical force developed at the rim of the driving wheels; the effect of coupling the wheels is merely to distribute this total figure over four, six or more points of contact with the rails, instead of the two only of the driving wheels proper. Otherwise the force developed would be greater than the adhesion of the engine could take up without slipping of the driving wheels. Tractive effort and, therefore, drawbar pull (which is considerably less than the theoretical tractive effort, owing to intermediate frictional losses in engine and tender), is the greatest on starting, and diminishes as the engine gets into speed. We will bear your suggestion in mind, though we cannot undertake to act on it.

[Reply to "AULD REEKIE."]

Midland Loco. Classification.

0-6-0 freight engines of the L.M.S. (Midland Division), other than the large superheated type, are divided between classes 3 and 2, but we have not space in which to enter into further particulars. In regard to your other query, so far as the strength of underline bridges is concerned, there is a considerable difference between one or two special journeys of a specially heavy locomotive type over any route, and daily workings for indefinite periods. This will explain how a Midland compound was able to run to and from Bath in connection with the Somerset and Dorset Railway trials. In any event, there is hardly sufficient present justification, relatively to the loads hauled, for the working of compound engines to and from Bath.

[Reply to R. A. ATHILL.]

Locomotive Classification.

We cannot go into details of the power and other special classifications of individual engines on various lines. Occasional changes of classification may be due to an alteration in the basis of classification. In the case of the G.W.R. 2-6-2T engines there are several series, and all may not be in the same power class owing to differing dimensions. There are, in fact, two main designs of these, one considerably smaller than the other, and which are necessarily classified differently. We are considering ways and means to satisfy our many readers who ask for details of the locomotives in use on various railways, and may be able to cover also power classification.

[Reply to "ALLIANCE" and OTHERS.]

Birmingham Trains, G.W.R.

"Castle" class locomotives are now used on some of the Birmingham two-hour expresses, and no doubt, in due course, they will also appear on other trains. Occasional unpunctuality of these trains, as of expresses elsewhere and on other lines, is not necessarily attributable to inadequate locomotive power, while even the most up-to-date locomotives are liable to be off colour now and then for one reason or another. It must be remembered, too, that a light duty one way may be coupled with a very heavy one the other, while first-class engine links usually have several secondary or light duties in the rota of turns allocated to them.

[Reply to F. V. B. EDGE.]

Train Timing.

A split-second chronograph contains two independent centre-second hands, and is designed somewhat on the lines of a maximum and minimum thermometer, in that one of the hands may be stopped at any moment, recording the exact position of the other hand at that precise fraction of a second; that is to say, with a watch of this type it is possible to take continuous readings from mile-posts, instead of alternate quarter-miles only, as with an ordinary chronograph. But the split-second chronograph is a very expensive luxury. Good and accurate timing work, however, may be performed with an ordinary centre-second flyback stop-watch.

[Reply to "SCOTS READER."]

"Cardean" Class, L.M.S. (Caledonian) Railway.

Cardean, No. 903 in the Caledonian list, and her sisters, Nos. 904 to 907 inclusive, were developments of the inside cylinder 4-6-0's Nos. 49 and 50; the latter were built by the Caledonian Railway in 1903—at the time of their construction the largest and most powerful express engines in the country—with a view to running West Coast express trains over Beattock

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without assistance. For many years *Cardean* ran the 2.0 p.m. London express from Glasgow to Carlisle, and returned with the 2.0 p.m. from London. Her name has now been removed.

[Reply to W. T. THORNEWELL.]

Locomotive Work on the Cheshire Lines.

We fear your figures as to speed on the C.L.C. are far from accurate, seeing that your station distances, from which you have worked them out, are only to the nearest quarter-mile, as compared with your times, which are in seconds. Over such short distances as 1¼ miles from Altcar to Lydiate this lays you open to serious error. We can also hardly agree with your description of the gradient up to the Ship Canal Bridge at Irlam as a "terrible climb," seeing that it is merely a mile in length on the west side, and 1¼ miles on the east, at no steeper inclination than 1 in 135.

[Reply to R. DYSON.]

Railway Carriage Running Gauges.

We assume that the vehicle you have noted at Blackheath, S.R., fitted with an enclosing frame from which project outwards a series of rods, has been equipped for gauging clearances under bridges and through tunnels and elsewhere. Presumably, if Granville Park box, between Lewisham Junction and Blackheath "A" box is closed, its signals are usually at "normal clear," except that the down stop signal, having a distant below it, is controlled and worked in conjunction with the distant from Blackheath "A" box. We take it that the box is open when the sidings have to be used.

[Reply to R. GHEURY DE BRAY.]

British Permanent Way.

For a great many years past the Great Western Railway has employed chairs secured to the sleepers by two fang-bolts only. The standard permanent way, now being adopted by all British railways, employs a three-hole chair, held down by three galvanised coach-screws to a sleeper 9 ft. by 10 in. by 5 in.; 18-in. bar fish-plates secured by four 15/16-in. pear-necked fishbolts; and 45 ft. rails with 18 sleepers to a length, except the L.M.S. Railway, which uses 60-ft. rails and 24 sleepers to a length; 95-lb. B.S. rails are used on main lines, and 85-lb. on branch lines.

[Reply to J. D. THOMSON.]

Great Western Speeds.

You are incorrect in describing the "Torbay Limited" as a faster train than the "Riviera Limited." To Newton Abbot—the point of divergence of the two routes—the latter is allowed 1 min. less than the former, *i.e.*, 203 mins. as against 204 mins.; that is, when the "Torbay Limited" is running non-stop to Torquay, as during the summer months. If you read more carefully the article to which you refer, you will see that the points you raise have no bearings on the comparison that you make. We have no information as to train speeds between Reading and Guildford.

[Reply to P. PETROKOCINO.]

Branch Line Closings.

The Nunhead, Greenwich Park, Woodside, Selsdon Road, and Crystal Palace and Norwood Junction-Beckenham Junction services were all withdrawn in the early war period, and, in view of development of road facilities in the districts concerned, have not been restored. It is possible that, with the development of electric traction in the districts in question, some of them may be brought into use again eventually, but we have no knowledge of any intention in that respect so far.

[Reply to G. R. LOCKIE.]

Indicator Shelters on Locomotives.

We have many times explained that for the purpose of taking indicator diagrams and conducting other tests, it is usual to erect round the front of the engine a framework for the protection of the men in carrying out their special duties. It is, presumably, such an erection which you saw fitted to S.R. locomotive No. 451 E. The connections you have noted between rails are the bonds which maintain electrical connection for the purposes of track circuit, and so on.

[Reply to "MENDIP."]

Mileage Sidings.

Sidings in goods yards where wagons concerned in haulage traffic only are handled, as distinct from those which involve loading and unloading, are gener-

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ally termed "mileage" sidings, in that, apart from classification of freight, weights, &c., only the element of distance conveyed is involved. Meldon Viaduct, near Okehampton, S.R., is subject to speed and engine-weight restrictions, because of its design and the fact that it was built many years ago.

[Reply to D. R. BECKETT.]

City to City Express, L.N.W.R.

The "City to City" express commenced to run on February 1, 1910. It was timed to leave Birmingham at 8.20 a.m., and arrive Broad Street at 10.35 a.m. The return train left Broad Street at 5.25 p.m., and reached Birmingham at 7.40 p.m. The London, Tilbury and Southend Railway has been dealt with at various times in THE RAILWAY MAGAZINE, though the particular phase mentioned by you has not received specific attention.

[Reply to NORTH LONDON.]

9.55 p.m. Scotch Express Excursion ex St. Pancras.

When run, this train calls at Leicester, 12.11-12.15 a.m., Masborough Sorting Sidings, 1.44-1.48 a.m., Whitehall Junction, Leeds (not entering the Wellington Station), 2.33-2.38 a.m., and reaches Carlisle at 5.0 a.m. We have no information on your other query, although to the best of our knowledge through train services are still maintained over the L.M.S. between Cambridge and Oxford.

[Reply to "EMMA."]

Caledonian Locomotives.

Nos. 49 and 50 (old numbering) were both 4-6-0 engines with 6 ft. 6 in. coupled wheels, the corresponding class with 5 ft. coupled wheels, originally used for the Oban section, commencing at 51. Remaining 4-6-0's with 6 ft. 6 in. wheels were Nos. 903-907, while No. 908 began the mixed-traffic series with 5 ft. 9 in. wheels, numbered 908-917. None of these engines was re-numbered prior to L.M.S. re-numbering.

[Reply to E. W. HODGE.]

Continental Trains, S.R.

The first Continental Boat express to leave Victoria, S.E. & C. section, S.R. headed by a locomotive of the "King Arthur" class, was first illustrated on page 178 of THE RAILWAY MAGAZINE for August, 1925. A Pullman Continental express hauled by a "King Arthur" class locomotive formed the subject of the plate in the November, 1925, issue, and another similar illustration was given in the October issue, page 307.

[Reply to J. K. HAYES.]

The Southern "King Arthurs."

Cylinder diameter of these engines is 20½ in. The figure of 19½ in., inadvertently mentioned by Mr. Allen in December last, was corrected by him in one of his subsequent articles. Nos. 745 and 747 of the Western Section are now classed with the "King Arthur" type, although belonging to the 736-755 Urie series. Length of these engines over buffers is 66 ft. 5 in.

[Reply to F. J. THOMAS and G. A. C. JONES.]

Trains on "Wrong" Road.

You are incorrect in imagining the express illustrated on p. 67 of the G. W. book "Caerphilly Castle" to be running on the wrong road. On the Great Western main line, as on the North Western, the fast lines are not in the centre, but are on the down, or south side, and the "relief," or slow, lines are on the up or north side. The express is correctly running on the up fast line.

[Reply to "EDMONDIAN."]

L.N.E.R. "Pacifics."

There is little or nothing to choose between the Gresley and Raven "Pacifics" in the matter of tractive power, as was proved when the Darlington-built No. 2400 was tried out over the G.N. main line shortly after her construction, in the hands of a N.E. driver. Tractive effort of the Horwich-built 4-cylinder 4-6-4 tanks, at 85 per cent. working pressure, is 28,880 lb.

[Reply to R. BIDDULPH.]

Engine Head-discs, L.M.S.R.

Where numbered discs are carried by freight engines on the L.M.S. system, it is in connection with traffic control, in order that the trains concerned may be readily recognised by signalmen and others concerned. 24 "Director" 4-4-0's are running on the N.B. section of the L.N.E.R., and their names were given on p. 213 of the March issue.

[Reply to "EVANDHU."]

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Great Southern (Ireland) Queries.

Curved steel sheets under certain goods brakes of this railway are for the purpose of spreading ballast; these vans are used on ballast trains, and spread the ballast evenly over the track, after it has been discharged from the hopper wagons in front. The track indications you have noted on either side of Bray Head probably denote restrictions of speed at this point.

[Reply to C. J. COGHLAN.]

High Speed at Newark.

We cannot go against official information as to the occasion when you claim that a L.N.E.R. train was doing something near 100 m.p.h. when passing Newark. In any case, the claims made by you seem to be as much on the extravagant side as you regard the official statement as severely under-estimated; and the matter must be left at that.

[Further reply to W. C. W.]

"Play" in Motion.

It is a practice at Doncaster to allow an exceptional amount of play in fitting big-ends to crank-pins, and in the fit of certain other motion details. We believe there are sound technical reasons for so doing, although the practice, which makes the engines noisy in running, especially with steam shut off, is not generally followed.

[Reply to C. S. S. B. KING.]

The Westbury Route, G.W.R.

Engines of the 47XX 2-8-0 class work over the Westbury route on such trains as the 10.10 p.m. freight from Paddington (Goods) to Laira, Plymouth, or the 11.35 p.m. from Paddington to Newton Abbot, but we cannot trace any regular workings of this type to Weymouth. We have no information as to the nature of the special train to which you refer.

[Reply to A. V. T. CHUBB.]

Bickley Curves, S.R.

We have not by us the precise distance by the up and down lines respectively between Chislehurst and Bickley, on the one hand, and St. Mary Cray and Orpington, on the other; the distances given in our February issue are those officially applicable to these loops in either direction, and the actual variation between up and down loops is only slight.

[Reply to L. H. BOYCE.]

Caledonian Loco. Classification.

We believe you are correct in your statement that the non-superheated 4-4-0 engines of the late Caledonian Railway rank as class 2, and that the types built by both Mr. McIntosh and Mr. Pickersgill with superheaters rank as class 3 in the L.M.S. classification. Cylinders of the Pickersgill engines are 20 in. diam. by 26 in. stroke.

[Reply to "MIDLAND COMPOUND."]

Services round Bedford.

On Sundays the 12.15 p.m. from Sandy to Bedford and the 12.24 p.m. from Bedford to Sandy are booked to cross each other at Willington, 12.34 to 12.36 p.m. The 8.0 a.m. on Sundays from Bedford to St. Pancras is allowed 2 mins. each at Ampthill and Flitwick for station duties, and 6 mins. at Harlington for attaching vehicles.

[Reply to "EMMA."]

Hints on Train Timing.

You cannot do better than study Mr. Cecil J. Allen's monthly articles on "British Locomotive Practice and Performance," which deal with all the leading main lines in turn, and give a large amount of detail as to the best points to time, gradients and the locations of maximum and minimum speeds, and so on.

[Reply to K. W. B. DAVIES.]

Most Powerful Scottish Express Engines.

Based on tractive effort, the 3-cylinder Caledonian 4-6-0 type takes the lead as regards tender engines, and the Glasgow & South Western 4-6-4 tanks hold the premier position among Scottish express tank engines. At 85 per cent. working pressure tractive effort of the former is 27,980 lb. and of the latter 26,740 lb.

[Reply to D. R. MARTIN.]

Birmingham and South Wales Service.

One express is run in each direction daily between Birmingham and South Wales by the Stratford-on-Avon route; but the remaining services run *via* Worcester, in view of the important towns served *en route*, such as Stourbridge, Kidderminster, Droitwich, Worcester, Malvern, Hereford and Pontypool.

(Reply to "TORTWORTH COURT.")

Fastest Trains.

You are correct in stating that the "West Coast Postal" is expected to

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cover the 23 miles 63 chains from Beattock Summit to Carstairs in 23 min., start-to-stop, when it has been piloted throughout from Carlisle to Summit, but this booking is of too conditional a nature to figure in our table of "fastest runs."

[Reply to DAVID L. SMITH.]

Metropolitan Railway.

Comprehensive articles on the Metropolitan Railway were published in THE RAILWAY MAGAZINE for April, 1905, and September, 1922. These issues are, however, now out of print. In addition, many other articles have included reference to the Metropolitan Railway or to sections of its activities.

[Reply to A. E. CABLE.]

High Speeds on G.E. Section, L.N.E.R.

The maximum rate of 82 m.p.h., mentioned in last September's issue, was attained down Ramsden Bellhouse bank, between Billericay and Wickford, on the Southend branch, which is inclined at 1 in 100. Speeds slightly in excess of 80 m.p.h. have also been recorded at times down Brentwood bank.

[Reply to F. LEMMON.]

R.O.D. Engines.

Provided that the motion parts of engines that are standing idle for a considerable period are well greased, and that the chimneys are covered, there should be no material depreciation in value, and this doubtless applies to the R. O. D. 2-8-0 locomotives which have, as yet, failed to find purchasers.

[Reply to C. K. DOUGLAS.]

L.M.S. Western Division Engines.

No information has been made public as to the Preston-Carlisle test runs of L.N.W. and L. & Y. 4-6-0 engines and Midland compounds over Shap. Limitation of the train-loads of Western Division engines to 360 tare tons is with a view to reduction in coal consumption.

[Reply to E. S. APPLEBAUM.]

Sand-boxes, L.M.S. (L.N.W. Section).

Extension in front of the splashers of "George the Fifth," "Prince of Wales," and other tender engines on this division of the L.M.S. houses the sand-box; the "box" in front of "Experiment" class engines, under the smoke-box door, merely covers the front ends of the cylinders.

[Reply to E. COPE.]

G.W. Locomotive Classes.

As you will see from the instructions at the head of this section we do not give lists of engines of individual classes. You can probably obtain the information you desire from the G.W.R. locomotive booklet of which particulars are given in our advertising pages.

[Reply to "REGULAR READER."]

The Edinburgh Pullman.

Weight of this train varies according to its formation, but with four twelve-wheeled and two eight-wheeled Pullmans and a bogie brake, as usually now carried, you may reckon the gross weight, with passengers and luggage, at about 270 tons.

[Reply to "CAERPHILLY CASTLE."]

Power Signalling, Southern Railway.

Signalling installation on the Southern Railway throughout from Woking to Basingstoke is low-pressure pneumatic, which is also installed between Waterloo and Clapham Junction, Andover and Grateley, and at Staines and Salisbury.

[Reply to P. B.]

Speed Records of the Past.

There is no authentication for the speed of 90 m.p.h. quoted by you as having been attained by an engine of 1845 on the Great North of England Railway between Belford and Beal, and it is highly improbable that any such rate was reached.

[Reply to H. ROBERTSHAW.]

G.C. "Atlantics," L.N.E.R.

There are no regular workings of Great Central "Atlantics" over the Great Northern main line, though the G.N. "Atlantics" are freely used on the Great Central section of the L.N.E.R. We have no information on your other query.

[Reply to E. P.]

"Pacific" No. 4470, L.N.E.R.

It was an "Atlantic" engine involved in the Retford accident, and not the pioneer 4-6-2 No. 4470, *Great Northern*, which, apart from periodical visits to "Plant" for overhaul, has been in continuous service since construction.

[Reply to "SCOTS READER."]

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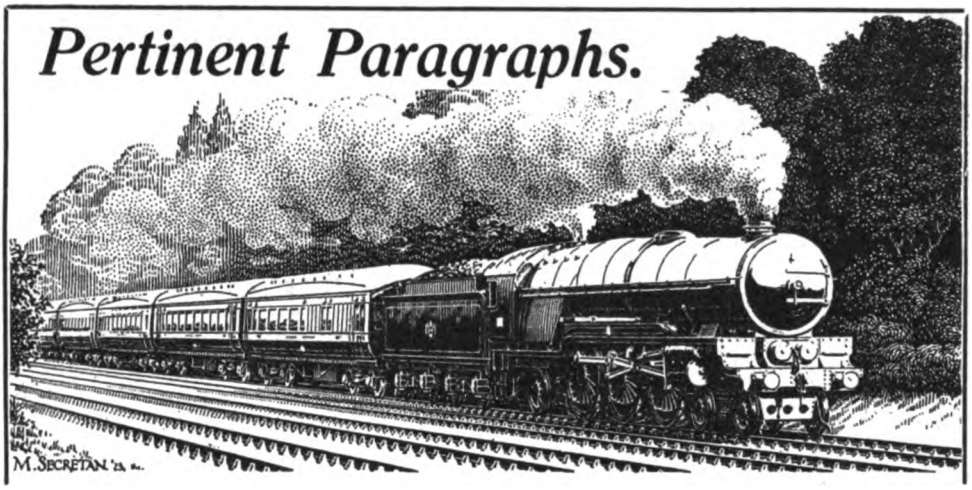
Pertinent Paragraphs.



A "Grand Old Man" of the Railway.

SIR BRADFORD LESLIE, who died recently in his 95th year, was the last survivor of those three grand old men among Indian railway engineers who have been taken from us within the past 15 months. The first of the three to go was Sir Guilford Molesworth, who died on January 21, 1925, and he was followed last autumn by Ernest Benedict, a fellow-pupil with Bradford Leslie, in the 'fifties, of Isambard Kingdom Brunel. Bradford Leslie had engineering in his blood from an inventive American grandfather, but he himself attributed his success as an Indian bridge-builder to his training under Brunel, which lasted from 1847 to 1859, and included responsible work on the Chepstow and Saltash bridges. His first Indian experience was on the Eastern Bengal Railway, for which he built the Gorai Bridge, and the Jubilee Bridge over the Ganges at Hooghly, connecting the Eastern Bengal and East Indian Railways, was begun under his supervision—but not according to his design—and was completed in 1886. Sir Bradford Leslie was bold and original in all his undertakings, and his designs for the Jubilee Bridge, for a new Howrah floating bridge, and for the lower Ganges Bridge would have cost much less than the bridges as sanctioned. He was a great supporter of the 5-ft. 6-in. gauge, and when Agent of the East Indian Railway was responsible for the introduction in 1878 of all-iron box-wagons of larger capacity and of Indian drivers on goods trains. To all his assistants and subordinates in India he endeared himself during his 22 years of work there (from 1865 to 1887) by his simplicity, truthfulness and care for their well-being. He never spared himself, and it was only the repeated attacks of illness that compelled him to come home for good in 1887 for a further span of busy life.

Cross-Country Train Services.

AN esteemed reader has raised the question of the difficulty of making cross-country journeys, except on a few special routes, which is so often experienced even on railways which have frequent, convenient, and fast trains on secondary as well as principal main routes. As he points out, there are hundreds of cases where, to get from one fairly big town to another of comparable importance, the journey may occupy a good part of the day, or, if there are one or two "practicable" services, they involve adjusting one's movements to a degree which is not always convenient. In a large number of cases, too, even if the journey can be made without too many intermediate changes and long waits at junctions, the average speed works out at about 25 m.p.h., if not considerably under that figure.

The trouble is, of course, that there are so many possible travel routes that no imaginable train service could be devised which would provide for all such services, especially in view of the fact that to meet general requirements several such services would require to be arranged during the day. An even bigger difficulty is that, while it may be convenient to arrange facilities from, say, A to B, C, D and E, the letters represent a series of towns which would seem to call for good intercommunication services—it may be very awkward to fit in connections from A to F and G, though F and G may have good services from B, C and D, though not from A. Further, it is a moot question whether, although the towns in question may be of considerable size, the passengers

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desiring to travel from one to another at any particular period of the day are sufficient to justify the arrangement of through services or good connections. Another point is, too, that if the attempt is made to alter connections to speed up particular journeys the result is often to upset another equally important series of connections.

Junction Connections.

ONE of the principal reasons why the main routes have fast through services is that there are sufficient passengers making the journey in question to justify such trains being scheduled, and there are many cases where regular trains are run on secondary and cross-country routes. But in the case of the majority of towns of small or medium size, and particularly for inter-communication between them, as distinct from medium-size towns and large city travel, it is necessary to depend upon junction connections. These usually entail that a feeding train arrives in advance of a through train, while a train on a secondary route in connection cannot leave until the main train has left. This frequently means, especially if a series of such inter-connected trains is concerned, a wait of half-an-hour or more before the journey can be continued. And if this sort of thing occurs two or three times in the course of a journey the result is a very big waste of time, though obviously if any one of the connections concerned were sacrificed the gain to one series of passengers would be at the expense of another series, all perhaps sufficient in number to justify consideration, though none numerous enough to render additional compensating facilities a paying proposition. The matter is often further complicated by the fact that some of the trains concerned have to make many intermediate stops because there is not sufficient traffic to justify both stopping and fast trains on the route in question.

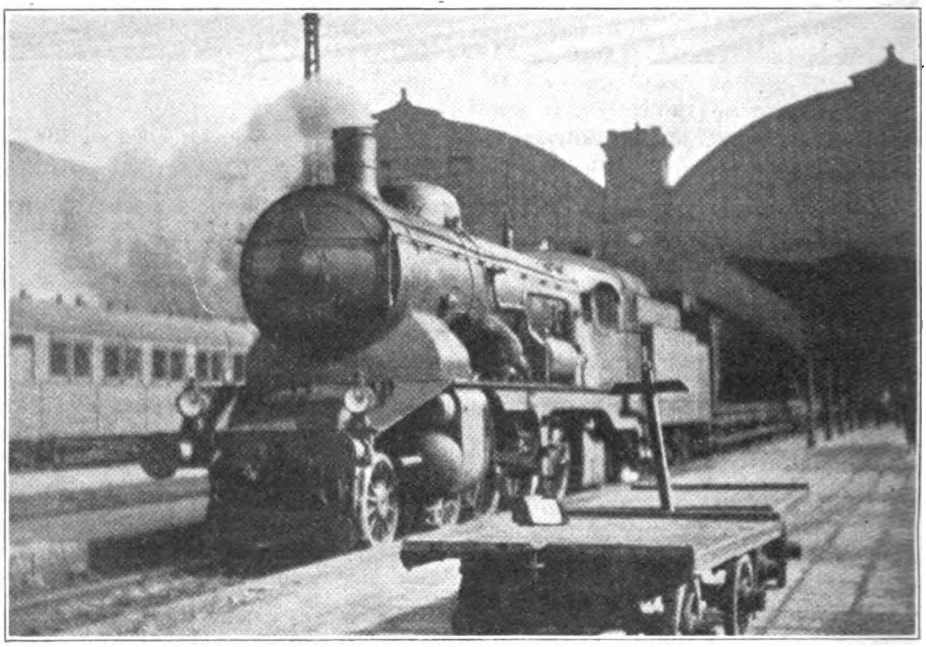

Photo.] [*C. Hamilton Ellis.*

GERMAN 4-6-2 LOCOMOTIVE No. 18,102 ON BERLIN MAIL TRAIN AT MUNICH.

Are Facilities really Inadequate ?

IT may be that our correspondent is right in his complaints as to the difficulty of making many journeys which would seem to justify better facilities than are given at present, and we have no doubt that many of our readers have had sad experiences of this. At the same time, we have reason to know that railway traffic officers are fully aware of this condition, and that possible solutions of the problem in particular cases are constantly under consideration. Frequently, too, the arrangements which apply are the result of a necessary compromise for the "good of the greatest number," and with full knowledge that there are

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many other passengers whose convenience not only cannot be met but must at times be sacrificed. It cannot be gainsaid, however, that this is one of the great defects of our railway services—indeed, of train services in any and every country where there is a multiplicity of medium-size towns within a given area, but served by interconnecting trains not on standard through routes. The trouble is, however, that in so many cases local omnibus services can and do provide the necessary facilities, though not always quite so well in practice as is made out by road traffic advocates, because they can obtain a sufficient load of through and intermediate passengers to justify their operation, though the same load, if catered for by train, could not possibly pay for its conveyance. Further, it does not follow that all road services are actually more convenient than rail facilities, except in cases where the railway route is an involved and roundabout one, due to the way our railway system has been built up, while the road route is relatively direct and serving intermediate territory which is not touched by the rail route at all.

Scenes on German Railways.

We are indebted to Mr. C. Hamilton Ellis for the photographs reproduced. One shows 4-6-2 locomotive No. 18,102 at Munich on the Berlin mail train, while the other shows a peculiar old 0-6-0 Bavarian goods engine, No. 1415. Mr. Hamilton Ellis remarks as follows: "The Bavarian State Railway carriages are much cleaner and more up-to-date than those used in the north of Germany, fourth-class cars are fitted with seats, while the 'thirds' are quite comfortable and roomy vehicles, although rather below British standards. Restaurant and sleeping cars are provided throughout Germany by the 'Mitropa' Company. For working long-distance trains in Bavaria the 4-6-2 type is very popular, although massive 2-8-2 machines are now making their appearance. Semi-fast and slow trains are, as a rule, hauled by older 2-6-0 and 4-6-0 locomotives. The Munich suburban services are largely operated by 2-6-4, 2-4-4 and 2-4-2 tank engines, although there are still many antiquated 2-4-0 and 0-6-0 tank locomotives in service. On the electrified mountain lines, Brown, Boveri 2-6-2 and 4-4 + 4-4 locomotives are employed."

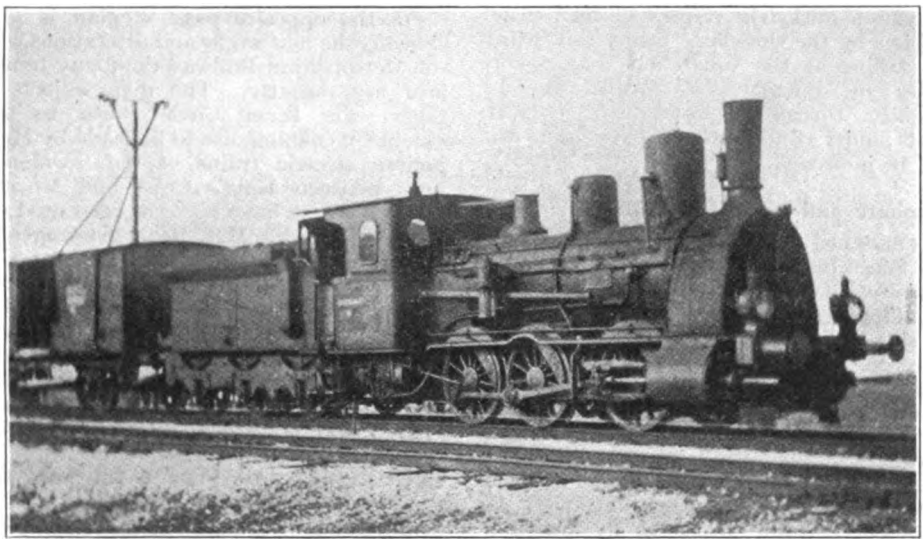

Photo.] [*C. Hamilton Ellis.*

OLD BAVARIAN 0-6-0 LOCOMOTIVE No. 1415.

Rail Motor Buffer Stop Collision.

On January 23 the 1.2 p.m. motor train from Yatton to Clevedon came into collision with the stop blocks at the latter station. Ten passengers were injured, five somewhat seriously, while a certain amount of damage was done to the train, which consisted of steam motor car No. 75 and trailer car No. 85. Major Hall's report to the Ministry of Transport points out that a buffer stop collision occurred at Clevedon in August, 1920, with a similar motor trailer combination, though under rather different circumstances. Major Hall mentions that it is

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clear that no question arises of any failure of, or defect in, the brake equipment of the set, though the driver made a good deal in his evidence of the absence of sand and his consequent inability to free the wheels in time to stop short of the terminus, though it is certainly possible that if sand had been available the collision might have been avoided. He considers that the initial brake application was made too late and when the train was travelling at a much higher rate of speed than the enginemen's evidence suggests. He therefore concludes that the accident was due to the fact that the driver approached the terminus at too high a speed and that the service application of the brake was not made sufficiently soon. In extenuation it is suggested that the enginemen may have been misled in respect of their exact position by the singularly heavy rain which was falling at the time. The report concludes by reference to means whereby visibility through glass-fronted compartments under conditions of heavy rain, &c., may be improved.

Plymouth and Dartmoor Railway.

REFERRING to a query in "The Why and the Wherefore" section in the January number, Mr. E. Joslin, writing from Port Pirie, South Australia, comments as follows: "I should like to point out that I was at home on leave in 1916, when the line was being ripped up, and while the old metal was surprisingly well preserved, it was either the ancient 'fish-bellied' type (with which, I believe, the line was laid), or a very light type of G.W. 'bridge-rail.' I was given to understand that it had all been bought for scrap, being mostly, if not wholly, cast iron. If you are going to publish an article on this old line, remember the new and old curves, and the tunnel. This is the second oldest in the world, being antedated by one on the Hay Railway.

"An old Devonian in Adelaide told me that if the P. & D. had been reasonably disposed, the S.D. would have joined it at Yelverton, via Cornwood and Cadover Bridge. This is as he had heard from his father. Personally, I believe that a line cutting under Compton to the Eggbuckland valley, and following up the old line to Riverford and then across to Cornwood, would reduce the grade about 1/200, if adequate tunnelling was indulged in. The 'fish-bellied' was infinitely better preserved than the 'bridge-rail.' The one overbridge, over the Plymbridge Road, was destroyed the same year, for safety reasons, as it looked pretty rickety in 1915 when I walked over it."

Mr. Joslin also sends some remarks on the Whyalla Iron Knob line (Broken Hill Proprietary Mining Company) in South Australia. It is laid with 80-lb. steel rails and is worked with two "Midako's" and two 4-6-0's, Nos. 6–7 and 4–5 respectively. These are of standard Baldwin build, and 6–7 are superheated and have electric headlights. "They are a great contrast to the S.A.R. narrow-gauge engines, and the line is a treat to ride over, if one doesn't mind being smothered in iron dust." Although the line in question is called a "tramway," Mr. Joslin describes it as "some tramway, 80-lb. rails and 2-8-2 engines, 3-ft. 6-in. gauge."

Metropolitan Railway Operating Developments.

ON the opposite page a plan is given showing the new works and alterations which the Metropolitan Railway Company brought into use recently. The main object is to relieve the Inner Circle route to some extent by enabling use to be made by Metropolitan electric trains of the "widened" lines between King's Cross and Moorgate Street. These have hitherto been used only by L.N.E. and L.M.S. steam passenger and goods trains, with partial user by G.W. goods trains to and from Smithfield, though they are and always have been Metropolitan property. The new works include several interesting features, some of which have not been fully brought out in our earlier reference to the undertaking. When St. Pancras station and hotel were built, a section of tunnel was constructed parallel with the Inner Circle route, but for the past sixty years or so has never been used. A new length of tunnel has now been constructed under Euston Road to connect the old tunnel with the up Circle line at a point towards Euston Square station, and electrically equipped track installed, so that City-bound Metropolitan trains can be transferred to the up widened line, which has been fitted with conductor rails, &c., through to two new platforms which have been constructed at Moorgate Street in place of the old bay used for so many years by L.M.S. (Midland) steam trains. To utilise the down widened line in the same way would offer little advantage, as it would involve a surface junction, but it has been electrified from Moorgate Street to Farringdon Street and new connections provided, so that down electric trains from the new platforms at Moorgate Street can be transferred at once to the down Circle line or at Farringdon Street. Up widened line electric trains can also reach the new platforms at Moorgate Street direct or at Farringdon Street. These changes offer interesting possibilities for

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future train service developments, though so far use is only being made to relieve the pressure at peak periods. The signalling developments associated with the work were referred to in our last issue.

PLAN OF LINES, EUSTON SQUARE TO MOORGATE STREET, SHOWING NEW CONNECTIONS WITH "WIDENED" LINES, NEW PLATFORMS AT MOORGATE STREET, &c.

By "Underground" 57 years ago.

Mr. C. E. Beames sends a folder issued by the Metropolitan Railway as a pocket time-table for July, 1869. It is issued under the signature of Myles Fenton, General Manager, from the offices at 32, Westbourne Terrace, and, although appearing under the auspices of the Metropolitan Railway, covers the whole of the circle route between Moorgate Street and Westminster, thus including a portion of the Metropolitan District Railway, at that time worked by, or in conjunction with, the Metropolitan Company. The times are given in series of vertical columns, and it is shown that the standard time for the journey from Moorgate Street to Westminster (of course, *via* Praed Street and High Street, Kensington) was 48 minutes, and trains seemed to have run at varying periods of 8, 10 or 12-minute intervals, lengthened in the early morning. Here and there a train was booked to run to South Kensington only, in one case Saturdays and Wednesdays excepted, or to and from Brompton (Gloucester Road) only. Week-day trains commenced at 5.10 a.m. from Moorgate Street and 5.15 a.m. from Brompton (Gloucester Road), the first train from Westminster leaving at 5.42 a.m. The last arrivals at Moorgate Street were 12·27 and 12·37 a.m., while the 12·11 and 12·25 a.m. from Moorgate Street ran as far as Brompton (Gloucester Road). On Sundays the first trains were the 8·3 a.m. from Moorgate Street, the 7·51 and 8·1 a.m. from Brompton (Gloucester Road), and the 7.59 a.m. from Westminster. The last trains were due to arrive at Moorgate Street at 11.48 p.m., and to depart from Moorgate Street at 11.23 p.m., running to Brompton (Gloucester Road) only. Speaking generally, the Sunday service was a 10-minute one each way, with, however, a break during the church interval. The folder is completed by a series of small advertisements, showing that even in those days, if the folders were distributed gratuitously, they were expected to pay for themselves in other ways.

Light Railways.

Writing from New Zealand, Mr. N. Blake sends some interesting comments on light railways, premising them by explaining that he has for many years been collecting articles thereon from the pages of The Railway Magazine and other publications. He continues :—" On looking through my file, I find I already have some twenty articles describing in an interesting manner some of the best-known light railways ; also many dealing with little-known and very remote systems possessing one or two engines at the most. My complete collection will form an interesting record of light railway

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developments and progress in Great Britain.

"In these days of grouping, most of the railways are fast losing their individuality. Particular styles in colours and types of locomotives, &c., are becoming merged into oblivion as the stock is absorbed by one or other of the great grouped companies. It seems a natural outcome, therefore, that readers' interests should be drawn to the still existing smaller systems, and light railways in particular, which can still lay claim to possessing some peculiarities which stamp them apart from the rest. To an enthusiast, one of the chief charms in studying railways as a hobby is in noting and comparing the different individualities of the systems. This is proved by the general lack of a great spontaneous interest in the American railways. They are built too much after the one pattern, and if the locomotives are not all as much alike as a bunch of Ford cars, they are at least lacking in variety in colour and type.

"With regard to the future of light railways in Great Britain, one can never foresee what is to happen in the way of new laws, and perhaps heavier taxes on road motor vehicles, all of which might give the light railway a new lease of life. To the writer it seems as if much could be accomplished by laying down light railways of standard gauge from outlying villages to connect up at the nearest railway station on the main line. Such lines could be worked by a small tank locomotive, to operate all goods traffic, and one or two converted motor-buses or lorries made to run on rails, to carry the passenger traffic. One man would suffice to perform the duties of driver, guard, and ticket-collector on the rail motors, and a driver and fireman (latter would also uncouple wagons and manipulate points at wayside stations) on the goods engine; it would be possible to run the goods trains with a train crew of only two. On steeply graded sections the engine could 'double back,' as the operation is known in the Colonies, taking half the train up the hill and placing it in a siding and returning light down the hill for the second portion, which would be left on the single main line and protected by detonators, as performed every day on railways in Australasia."

Fenny Stratford Level Crossing Accident.

MAJOR HALL's report to the Ministry of Transport in regard to this accident, which occurred on December 8, shows that the train concerned was the 6.30 p.m. from Cambridge to Bletchley, drawn by 2-4-0 engine No. 1170. Presumably, the only reason why this accident was reported upon by one of the inspecting officers of the Ministry of Transport was that questions arose as to the arrangements at the level crossing, as, otherwise, it was really a road traffic accident, with the complication that the charabanc ran through the level crossing gates just as a train was approaching, with the result that six persons were killed at the time and three died subsequently. Major Hall attributes the accident as more probably due to an error of judgment on the part of the driver of the road vehicle than that any failure of the brake equipment occurred. With regard to the suggestion that the gates were not sufficiently indicated or visible to the driver, Major Hall is satisfied that the driver of the car was well aware both of the exact location of the crossing and the fact that the gates were closed.

Waterford and Tramore Railway.

SEVERAL readers have written in regard to the reply to "R. I. N." in "The Why and the Wherefore" section in our April number, pointing out particularly that, although both the Great Southern and Western and Dublin and South Eastern sections of the Great Southern Railways serve Waterford, the Waterford and Tramore Railway is in every sense "isolated," there being no physical connection with other lines and the respective stations being on opposite sides of the river. Mr. K. A. C. R. Nunn sends a photograph showing an old 2-2-2 tank engine, one of the two engines of this type still in use. They were built by Fairbairn in 1855, and thus, as pointed out by Mr. Nunn, rank among the oldest locomotives still in service. They are also the only single-wheeled locomotives still at work in Ireland. Mr. Nunn also mentions that it was only recently that the old "Bury" single engine No. 4 was scrapped, while the train of original rolling-stock is still preserved. No. 2 (illustrated) was working the traffic when Mr. Nunn last visited the line in 1924. The cab extension was added quite recently. There is a further peculiarity of the Waterford and Tramore Railway, in that, although it has a length of 7½ miles, there is no intermediate station or stopping place. Mr. J. A. Dane writes in somewhat similar strain, mentioning that the respective stations in Waterford are about a mile apart.

Mr. F. H. Alexander writes as follows:—"I know Waterford very well, although I have not been there since the war, and changes may have recently been made; but to connect the little line of 7 miles in length with the existing Great Southern Railway would mean making a line about 1½ miles long through the heart of the city

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and would cost more than the whole line could be built for at present day prices of labour and material. I do not suppose such a connection has been attempted as its usefulness could not be made to pay the charges incidental to such use of capital. The terminus of the line is about 1½ miles from the Waterford (G.S.R.) station and a river more than twice the width of the Thames at Westminster lies between the two stations. It is, of course, quite possible for the line to be under the management of the G.S. Railway, but I submit that the term 'isolated' is a reasonably correct description."

High Speeds in America.

FROM Mr. Eric L. Crickmay, who so frequently has supplied us with information concerning the current doings of American railways, comes the interesting news that the Philadelphia and Reading R.R. now has *ten* expresses scheduled to make the 22-mile run between Jenkintown and Trenton Junction (between Philadelphia and New York) in 22 minutes, start-to-stop, three others make the same journey in 23 minutes. Again, the Michigan Central express No. 30, which figured in some recent paragraphs on American speeds, is now booked to run from Windsor to St. Thomas, start-to-stop, 109·6 miles, in 110 minutes. "England must wake up," writes Mr. Crickmay, by way of comment, both on these achievements and on those of the French Nord, detailed in recent issues of THE RAILWAY MAGAZINE. The fastest current Canadian booking is that of an express which covers the 128·7 miles from Smith's Falls to Montreal in 155 minutes, with five intermediate stops included; the 73·5 miles from Bedell to St. Clet are run in 79 minutes. As a final note Mr. Crickmay adds that the "Twentieth Century Limited," which runs over the New York Central Lines between New York and Chicago, a distance of 979 miles, in 20 hours, earned a gross revenue of no less than $10,000,000 last year. So popular is it with the American travelling public, despite an extra fare of $9·60 (nearly £2), that it has to be run daily in from three to six sections!

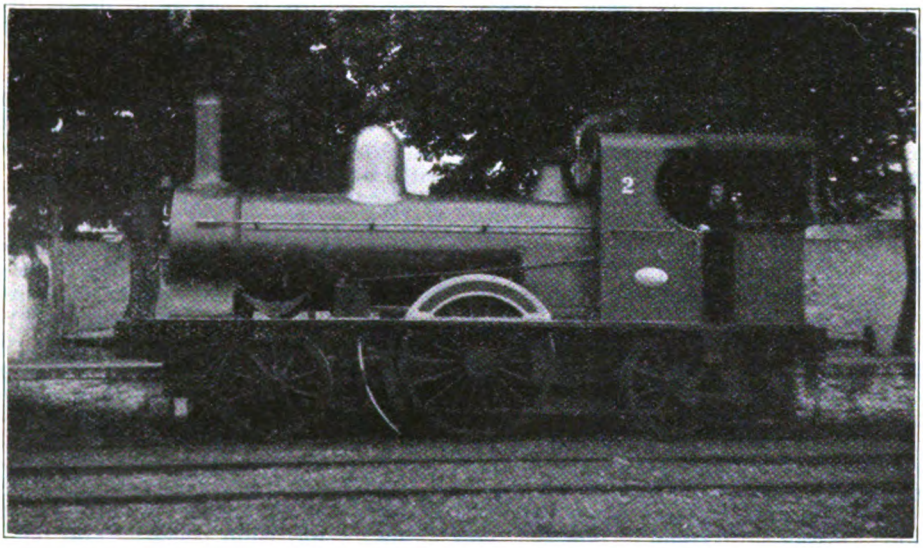

Photo.] [*K. A. C. R. Nunn.*

OLD SINGLE TANK ENGINE, WATERFORD & TRAMORE RAILWAY.

2-2-2 Tank No. 2, built in 1855 and rebuilt in 1897.

L.N.E.R. Concert at Queen's Hall.

THE 1925–26 season—the eighteenth—was concluded, so far as London is concerned on Saturday, March 27, this being the 135th concert to the record of the London and North Eastern Railway Musical Society. As usual, the male voice choir was at its full strength of 300 voices, combining the choirs in London, Cambridge, Doncaster, Yarmouth, Ipswich, King's Lynn, Norwich, Peterborough, York, &c., while the orchestra numbered 100. Colonel Galloway conducted. There was one soloist only, Miss Lilian Stiles-Allen.

Shortly after the interval, Sir Ralph

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Wedgwood, Chief General Manager, L.N.E.R., proposed a vote of thanks to Mr. William Whitelaw, Chairman of the L.N.E.R., who occupied the chair, remarking that, although Mr. Whitelaw had been at many of their concerts, the more they saw of him the more they realised that without his presence their concerts would have to be regarded as incomplete. These concerts had become, in effect, gatherings of the L.N.E.R. family, and they were only too pleased that they should be presided over by the head of this family. Sir Ralph Wedgwood then made some allusions to the Edinburgh concert, due to be given on April 10, which had been arranged on Mr. Whitelaw's personal invitation. The Society regarded it as an honour to receive this invitation, and he thought that Edinburgh would also consider itself honoured by the visit. Proceeding to the platform to reply, Mr. Whitelaw was received with acclamation, including the rendering of "For He's a Jolly Good Fellow," with full organ and orchestral accompaniment. In his opening remarks, he said that on such an evening even a railway chairman could not be downhearted. There was nothing to be downhearted about. They were coming out of the darkness of a very anxious year into the light. This week the right country won the football match; that day the right University had won the Boat Race; while the traffics were a little bit up and the expenditure a little bit down. He then emphasised that, just as the success of that concert depended upon everyone doing his or her part at the proper time and in the proper place, so in the railway service the same spirit was necessary, and they could only succeed as each one tried to do his or her part, whether as a leading figure or in a subsidiary position. If that spirit could become general, then "our railway and our country will one day solve all their problems." Chaffing Sir Ralph Wedgwood on his allusion to a west wind blowing along Prince's Street, Mr. Whitelaw concluded with a few remarks to the choir and orchestra as to their visit to Edinburgh, including the humorous admonition to bring overcoats but not umbrellas.

Arrangements were under the direction of the Concert Committee, of which Mr. Percy Syder is Chairman, but owed a great deal to the careful attention in every detail given by Mr. A. W. Headley, Hon. Orchestral and General Secretary, assisted by Mr. J. V. Gosling. As in previous years, members of the L.N.E.R. staff were invited to submit designs for the programme cover, that used on this occasion, the work of Mr. E. Costin, of the L.N.E.R. Sheet Factory, Peterborough, having been adjudged the best of some 49 submitted for the prize offered.

G.W.R. Record Journeys from Plymouth to London.

On Friday, April 9, 300 American and Continental members of the International Hotel Alliance arrived at Plymouth per the s.s. *La France*, where they received a civic welcome from the Mayor and Mayoress of Plymouth, Mr. R. H. Nicholls, Superintendent of the Line, G.W.R., and other G.W. officers, and members of the Transport Committee of the Hotels and Restaurants Association. Two of the G.W.R. steamers attached to Plymouth docks acted as tenders to *La France*, which lay just inside the breakwater in Plymouth Sound, one bringing the luggage of the visitors, and the other the passengers themselves. Two special trains were in waiting, and, the luggage having been promptly passed through the Customs, all the passengers were soon accommodated in one train or the other, every compartment being numbered, so that each person could go at once to the allotted section.

The first train consisted of two restaurant cars, three large first-class compartment vehicles, and one brake first carriage, together with two ocean mail vans, used on this occasion for carrying passengers' luggage—a considerable item. The second train included two restaurant cars, four first-class compartment carriages, and two brake first coaches. Both trains had of necessity to run in one or other of the conditional paths scheduled in the G.W.R. working timetables, the time allowed being 4 hr. 4 min. from Plymouth docks to Paddington, though, as will be seen, both trains improved on this schedule. The first train was drawn by "Castle" class locomotive No. 4083, *Abbotsbury Castle*, the driver being A. Webber and the fireman E. Gibson, Chief Locomotive Inspector Flewellyn being also on the footplate. The accompanying tabular statement indicates the main features of the running of both trains, together with various items of interest.

At Paddington station very complete arrangements were made whereby passengers' luggage was delivered by a fleet of motor vans, in waiting at the station, direct from the trains to the hotels to which they had been allocated.

On the Sunday the Southern Railway ran two special trains, one from Waterloo at 9.5 a.m. direct to Southampton Docks, proceeding afterwards to Bournemouth (Central) station, from which a through run was made back to London, while the other party were conveyed in a special Pullman car train to Brighton and back, and proceedings in the vicinity of London including a visit to Messrs. Lyons's Works at Greenford. On Tuesday two special trains were

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run from King's Cross at 9.40 and 9.50 a.m. to York, where the visitors were received by Mr. G. Davidson, Divisional General Manager, L.N.E.R. After inspecting places of interest in York, the visitors were conveyed to Liverpool (Lime Street) and entertained at the L.M.S.R. Adelphi Hotel, sleeping accommodation being provided there and at the North Western and Exchange Station Hotels. Wednesday's proceedings included a trip from Liverpool to Chester by L.M.S.R. special trains, return to Manchester, and, after proceedings there, return trips booked in 3 hr. 25 min. and 3 hr. 30 min. from Manchester (London Road) to Euston.

Distance, Point to Point.		Stations.	First Special.			Second Special.		
			Times.	Minutes Occupied, Point to Point.	Speed, Point to Point.	Times.	Minutes Occupied, Point to Point.	Speed, Point to Point.
M.	Ch.		p.m.		m.p.h.	p.m.		m.p.h.
—	—	Plymouth Docks ..	dep. 5.36	—	—	5·51	—	—
1	20	North Road.. ..	pass. 5.40	4	18·7	5·55	4	18·7
23	28	Ashburton Jcn. ..	,, 6.8	28	50·0	6·25	30	46·7
8	38	Newton Abbot ..	,, 6.18½	10½	48·4	6·37	12	42·4
20	18	Exeter	,, 6.41	22½	53·9	6·59	22	55·4
30	60	Taunton	,, 7.11	30	61·5	7·30	31	59·5
27	45	Castle Cary	,, 7.37	26	63·6	7·55	25	66·1
19	63	Westbury	,, 7.59	22	54·0	8·17	22	54·0
29	12	Bedwyn	,, 8.27	28	62·5	8·45	28	62·5
13	26	Newbury	,, 8.38	11	72·7	8·57	12	66·6
17	9	Reading	,, 8.54½	16½	62·2	9·12	15	68·4
17	42	Slough	,, 9.10	15½	67·8	9·27	15	70·1
18	36	Paddington	arr. 9.29	19	58·3	9·46	19	58·3
226	77			233			235	

	First Special.	Second Special.
Load, excluding engine	273 tons 1 cwt. ..	286 tons 8 cwts.
Engine	No. 4083, *Abbotsbury Castle* (Driver Webber)	No. 4085, *Berkeley Castle*. (Driver Salter).
Average speed throughout	58·5 miles per hour ..	57·5 miles per hour.
Westbury to Paddington ..	95½ miles in 90 mins.	95½ miles in 89 mins.

On Thursday the G.W.R. provided special trains from Paddington to Oxford and Stratford-on-Avon, while Friday's proceedings were to be in London. On the Saturday the Southern Railway provided special trains and boats from Victoria to Dover, and thence to Boulogne *en route* to Paris.

British Permanent Way.

A "CONTINENTAL ENGINEER" has been contributing to the columns of a weekly engineering paper his views on British railway practice. He is very enthusiastic about the quality of our permanent way. "English engineers," he says, "have always known how to obviate the defects of joints, . . . In spite of all difficulties, they have succeeded in producing a quality of permanent way which is without equal." Later he says our permanent way "is now and has been for a great many years, absolutely unique." This he attributes to the cleanliness and drainage of the roadbed, to the creosoted pine sleepers, of sufficient scantling to form an excellent support on the ballast, to the thick and elastic bed of ballast, to the close inspection of rail joints and to the great care exercised on the up-keep. This perfection of British permanent way is obtained although our rails are not so heavy or so long as on the Continent, nor are our sleepers so close together as on American railroads. There the jolt of the rail joint is sought to be obviated by employing the expensive 6-wheel bogies and heavy vehicles, but the result does not produce the smooth running to be found on British railways.

The bull-headed rail the "Continental Engineer" proclaims to be "incontestably the best," as employed on our lines. The bull-headed rail is peculiar to Great Britain and to three French railways, but two of these are now likely to adopt the otherwise universal Vignoles rail. The guard rail on curves also appears to be personal to our railways, but the writer we are quoting says "it certainly assists trains in entering

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curves." He expresses surprise that British railways continue to employ wooden keys, especially as they fall out and require constant tightening by platelayers, whilst the metallic and elastic keys, used on French railways, tighten themselves automatically. The remarkable freedom from accidents on British railways, he attributes to the "strict control placed in the hands of specialists" —evidently not obtainable on State railways as he continues: "Those, of whom there are still some in England," who demand a nationalisation of the railways, exhibit a total ignorance of the question, or seek nothing but political ends."

British Signalling Practice.

THE same "Continental Engineer" applauds the simplicity and efficiency of British railway signalling, as well as the general employment of the semaphore. "Those lines," he remarks, "which, at the outset, adopted the system actually as it is operated in England, have every reason to congratulate themselves on their perspicacity." Our signalling system also he praises for its extreme simplicity, remarking that the French method of signalling is special and complex. He mentions an advantage of the semaphore, *i.e.*, when lowered to an angle of 45 degs. to indicate "line clear," it is not completely effaced, as is the disc employed abroad, which in effect is effaced when turned edge on. Moreover our "all right" green light is awarded by this observant writer advantage over the white "clear" light shown when the disc signal is "off." The disadvantages of the notched distant semaphore at night are however, noted, but he apparently had not observed the reflected fish-tail as used on sections of the Southern and L.N.E. Railways, nor do distant signals on separate posts appear to have come acutely under his observation, as he refers to the notched arm being generally fixed on the same post as the stop signal. This practice is, of course, only employed where the block sections are short.

He criticises our practice of showing signals on posts at the side of the line, and that these posts often carry several arms, that may refer to junctions, cross overs, &c. making it necessary for a driver to know the road, or be provided with a pilot. The French plan of placing the signals on a bridge across the metals, each signal only controlling the road actually beneath it, is preferred by the writer we quote. We would, however, remark that such signal bridges are frequently to be found on British railways in the vicinity of the termini, and on the Southern Railway, also on the inner suburban sections. Red lights for both distant and home signals at danger as used on our railways are criticised, but the substitution of an orange light for the former is not suggested by the "Continental Engineer," his plan is one red light for the distant and two for the stop signal.

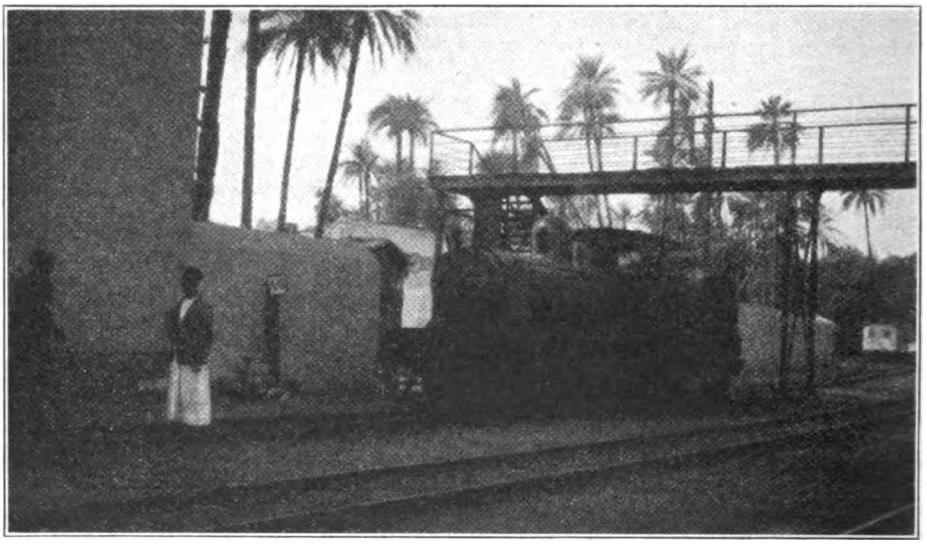

Photo.] [*Lord Monkswell.*

4-4-0 LOCOMOTIVE WAITING AT ASSOUAN TO TAKE ASSOUAN-LUXOR TRAIN, SUDAN GOVERNMENT RAILWAYS.

(Note kilometre post with Arabic indications.)

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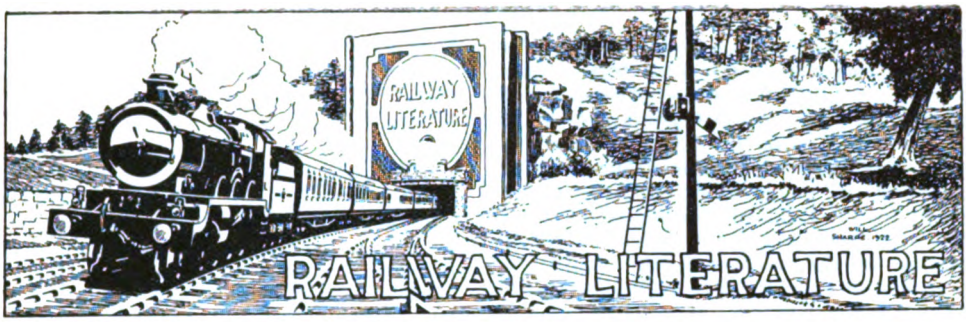

THE RAILWAY YEAR BOOK, 1926. Railway Publishing Co. Ltd., 33, Tothill Street, Westminster, London, S.W.1. Price 5s. net; by post, 5s. 6d.

The fact that the 1926 edition, now on sale from these offices, is the 29th annual issue, affords abundant indication that this useful reference volume has fully justified the large amount of time and trouble entailed in the collection and presentation of the tremendous amount of statistical, historical, technical, and other information contained within its nearly 400 pages. Although there are not so many changes as in the last two or three editions, as the reorganisation and other inevitable changes due to the grouping of British railways have now, to all intents and purposes, been effected, while amalgamation procedure in the Irish Free State is now virtually finished, the present volume may be regarded as the first in which official, statistical and historical information in regard to all the railways affected is set forth on a substantially permanent basis. For that reason, and in view of the fact that it has also received a great deal of detailed attention, while much additional or amplified information under many headings is included, it should have an ever-wider sphere of usefulness than previous editions.

The most essential change is that the article on the Great Southern Railways (Ireland) is now presented in a form which will, presumably, cover the situation for some years ahead, except for the usual annual revision. Particulars as to minor railways, and joint and leased and worked lines, both British and Irish, have also been completely overhauled to cover the various changes in regard thereto which have taken place.

Of the 11 large folded maps and nine smaller ones included, those for the Southern, London "Underground," Australian and Canadian railways are new ones, while several others have received minor corrections as required. In the case of all railways dealt with, whether in Great Britain Northern Ireland, or the Irish Free State, or in British Colonies, Dominions, Protectorates, &c., the particulars as to chief officers and other personnel, organisation, statistics and general information have been revised practically up to the date of closing for press. Some parts have, in fact, been largely or entirely re-written, particularly the Canadian section and portions of the Indian.

The inclusion in last year's edition of a detailed "Index," in addition to a list of "Principal Contents," has been much appreciated by users generally, and in the present volume the former has been amplified to some extent. The "Who's Who" section includes a large number of additional biographies, while all the numerous changes which have taken place during the year are covered.

As in past years the Editor acknowledges the co-operation and assistance of railway officers at home and abroad, who have in many cases gone to considerable trouble in revising not only personnal and organisation particulars, but also historical and statistical information. Appreciation is expressed in the preface, too, of the many indications which have come to hand of the usefulness of *The Railway Year Book* in the offices of railway companies, Government departments, and trading and manufacturing firms, as well as among general readers, "showing that it has continued to maintain its long-established reputation as 'the Whitaker of the Railway World.'"

MODERN RAILWAY ADMINISTRATION.—A Practical Treatise by Leading Railway Experts. 2 vols. Price 36s. [Gresham Publishing Co. Ltd., 66, Chandos Street, W.C.2.]

In these two volumes will be found a wealth of up-to-date information on railway working conditions, which cannot be obtained elsewhere in so compact and accurate a form. Both the general reader who is intelligently interested in railway matters, and the railwayman who is desirous of attaining a wider working knowledge of co-ordinated sections in the railway service will get what he wants from the different articles by recognised railway experts which are grouped together in the book. Starting with well-illustrated chapters on the early history of the railway, the first volume goes on to deal

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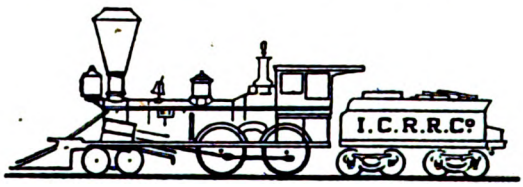
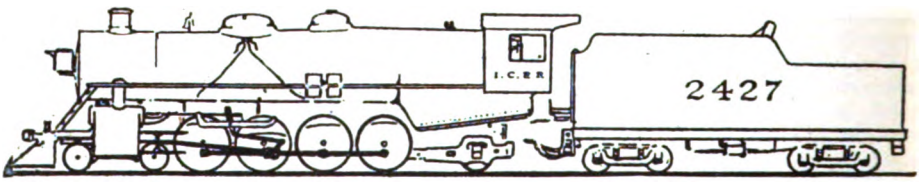
with the constitution of railway companies, their financial and legal status. The Elements of Railway Goods Rates, another of the sections contained in the first volume, is of particular interest and value just now when the Railway Rates Tribunal is engaged in considering the schedules of standard charges applicable to the four railway groups. Another notable feature of this section is the chapter on Continental Rates. Very appropriately this section is followed by a thoroughly practical treatise on the Working of the Goods Department which is illustrated by forms of invoices and other working documents. Similarly, in the second volume every aspect of passenger traffic is covered by the section on "The Economics of Passenger Traffic" which is also fully illustrated by specimens of working documents, and by the section on "The Manipulation of Passenger Traffic." In the latter section will be found excellent plans of typical stations, terminal, junction, road-side and single-line stations, which materially increase its value.

"Labour Organisation on British Railways" is treated in another section in an admirable spirit, and "The Administrative Reorganisation of the Railways Following the War" concisely sums up the situation created by recent legislation. "Railway Rating and Valuation" is a difficult matter to tackle, but it is made quite clear and interesting by the article on the subject, which includes a diagram showing the practical application of rating law to the lines in a passenger and goods station. "The Law Relating to Railways" has a section to itself, and "The Organisation of the Docks and Marine Department" and "The Economics of Dock Administration" complete this many-sided work, which should secure a wide appreciation.

THE Illinois Central Railroad Company, U.S.A., send, through their London office, a booklet which has been prepared in view of the fact that, in February, the Illinois Central system celebrated its 75th anniversary. From a railroad comprising 705½ miles of charter lines in only one State, the Illinois Central has grown into a system which, including the Central of Georgia Railway, comprises 8,500 miles operating in fifteen States of the Middle West and the South. In addition, the system includes the Ocean Steamship Company, which operates a fleet of eight ships between Savannah, Ga., and New York and Boston. In 1856, the year the charter lines were completed, the railroad owned 83 locomotives, 52 passenger cars, and 1,249 freight cars, and represented an investment of around $26,000,000. At present the system owns 2,300 locomotives, 2,300 passenger cars, and 79,000 freight cars, and represents an investment in railway properties of more than $270,000,000. In 1925 its locomotives ran 64,000,000 miles, transporting 38,000,000 passengers and 79,000,000 tons of freight. Included in the booklet is a block showing a comparison of locomotives used in 1856 and 1926, and this is reproduced as a matter of comparative interest.





ILLINOIS CENTRAL LOCOMOTIVES, 1856-1926.

Messrs. Halton & Truscott Smith, of 57, Haymarket, London, S.W.1, send "Folio I" of a series of "Famous Etchings from Dürer to Whistler." The price is 5s. This volume includes 12 photogravure plates prepared, with descriptive text, under the editorship of Mr. R. A. Walker. The plates, though none

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is of railway interest, will certainly appeal to all interested in artistic matters, not a few of whom are included among readers of THE RAILWAY MAGAZINE.

THE Norman W. Henley Publishing Company, of 2, West 45th Street, New York, U.S.A., send a copy of their 1926 catalogue of railroad books. A copy of this will be sent gratis to any applicant.

MR. H. E. POTTER, writing from the Hopton Holiday Camp, near Gorleston, sends a copy of a new booklet, written by a well-known journalist, describing "the delights of a camp holiday near the sea—with its free, open-air life; an economical 'Ideal Holiday' for the jaded town worker." The booklet is well produced, with many interesting illustrations. Copies, together with particulars of charges for holidays spent at the Hopton Holiday Camp, can be had on application to Mr. Potter.

OLD RAILWAY CARRIAGE DWELLINGS.

IT would be of interest to learn for how many years discarded railway carriage bodies have been employed for extraneous uses. The late London, Brighton & South Coast Railway was always well to the fore in disposing of these coach bodies for various purposes, and for about forty years past railways have done a large regular trade in the sale of railway carriage bodies no longer suitable for traffic. The practice is of much earlier origin. About 60 years ago there was deposited at Hove upon what was the beach, the body of a railway coach then considered no longer suitable for railway service, but this early vehicle must have been constructed of excellent material, as it is still in use (as a refreshment kiosk) and comparatively little of the original material has been replaced.

The appearance and size of this veteran railway coach proclaim it to be of very early construction, and although of wood, may last the proverbial 99 years of leasehold houses constructed of brick and stone. The frame work is all outside the lining timbers both at sides and ends, instead of being covered as is now usual. The end frames each consists of four vertical divisions, the scantling outside, as is still usual in older covered goods wagons. The approximate measurements of the body are :—22 ft. long, 7 ft. 8 in. wide, height at eaves 6 ft. 1 in., at centre 6 ft. 4 in. The body was divided into five compartments, the doors 20 in. wide and seats 15½ in. wide, the width of each compartment being about 4 ft. 3 in., the quarter lights are 9 in. wide, and 18 in. high, between the top of them and the roof are 4 horizontal louvres for ventilation, each about 2 ft. 9 in. long, no louvres being provided above the end seats. In the interior there is still one division that reaches the roof: it has a semi-circular piece cut out at the top in the centre so that a lamp inserted through the roof would light two compartments. As this division between the compartments is carried to the roof, the coach may have been a second class carriage. The owner of the vehicle says that the framework is mahogany (teak ?) and points out that the vertical scantlings have been scarfed about 3 ft. 9 in. from the floor.

This seems to suggest that this railway vehicle was originally an open 3rd class vehicle, and later had the sides made about 2 ft. 4 in. higher and a roof provided, so becoming a closed carriage. If this be so, the coach was probably built in 1845, and after about 25 years was considered no longer suitable for use on the railway.

That it should be in existence 60 years later, during the whole of which period it has been exposed to sea, winds and storms, speaks well for the materials employed, and suggests that on a new frame the railway might have kept the body in service many years longer than was the case. The owner says that for about 35 years (from 1866-1901) the carriage was used as a dwelling, and a family was born and brought up in it; more recently it has been, and still is, used as a refreshment stall. In later years a sea wall and esplanade (King's Esplanade) have been constructed between the sea and the railway carriage, which without being moved now fronts the road, on land that has been reclaimed from the beach.

The discontinuance of 4- and 6-wheel railway coaches will mean that the public will not be able to obtain cheap huts, sheds, &c., from the railways as in the past, the length of bogie coaches making them too unwieldy for transport by road, although we recently saw at Rye a bogie coach cut in two and mounted on a steam lorry and its trailer, for conveyance by road to its destination.

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WHAT THE RAILWAYS ARE DOING.

THE directors of the Great Western Railway have authorised the following appointments :—

Mr. C. S. Page, Assistant Docks Manager, to be Chief Docks Manager, in succession to Mr. E. Lowther.

Mr. H. Wheeler, Chief Clerk to the General Manager, to be Assistant to the General Manager.

Mr. G. E. Orton, Publicity Department, Superintendent of Line's office, to be Assistant Publicity Agent.

* * *

MR. CHARLES SYDNEY PAGE, who has been appointed Chief Docks Manager, G.W.R., on the retirement from that position of Mr. Edward Lowther, is a native of York. He entered the service of the North Eastern Railway, in 1887, as a clerk in the General Goods Manager's office at York, where he remained four years, being then promoted to the General Manager's office. Mr. Page remained in the General Manager's office for 13 years, during the last nine of which he occupied the position of personal clerk to the then General Manager, the late Sir George Gibb. Subsequently he occupied the positions of Chief Clerk to the Hull District Goods and Docks Manager, Yardmaster at Hull, Assistant Divisional Goods Manager at Hull, Goods Manager for the York and Leeds District, and District Superintendent at Hull. The wide and practical experience gained by Mr. Page on the North Eastern Railway led to his being invited to the position of Assistant General Manager of the Cardiff Railway, the owners of all the Cardiff docks, and he took up this post in 1920. On the amalgamation of the South Wales Docks and Railways with the Great Western Railway in 1922, under the operation of the Railways Act, Mr. Page became Assistant Chief Docks Manager.

MR. C. S. PAGE,

Appointed Chief Docks Manager, G.W.R.

* * *

THE directors of the London and North Eastern Railway have appointed Mr. F. W. Wheddon, Stationmaster at York, to be District Passenger Manager at Manchester, in succession to Mr. C. G. Dandridge, who has lately been appointed to a similar position in the London district.

MR. J. STUDD, Assistant to the Passenger Manager, Southern Area, retired from the service on April 30.

MR. J. W. ODDY, head of the Traffic Section of the Passenger Manager's Department at Liverpool Street, has been appointed an Assistant to the Passenger Manager in succession to Mr. Studd.

* * *

THE death took place at his residence, Mosesfield Terrace, Springburn, Glasgow, on March 27, after a short illness, of Mr. J. P. Grassick, Locomotive Running Superintendent (Scotland), L.N.E.R. Mr. Grassick became Locomotive Running Superintendent, North British Railway, in January, 1920, and

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continued to hold a corresponding position for the Scottish Area on the formation of the L.N.E.R.

* * *

We regret to record the death, at Nice, in his seventy-fourth year, of Mr. William Edward Dorrington, a director of the London Midland & Scottish Railway Company, and for many years on the Board of the L. & N.W.R.

* * *

The Minister of Transport, Colonel Wilfrid Ashley, has appointed Mr. G. F. Stedman, M.C., to be his Private Secretary, *vice* Major F. Gordon Tucker, O.B.E., T.D., promoted.

* * *

A memorial tablet was recently unveiled at Yarm, near Stockton, in view of the fact that the meeting which resulted in the formation of the Stockton & Darlington Railway was held on February 12, 1820, at the "George and Dragon" Hotel. There is already a tablet on that building. The new tablet, which is at the Town Hall, bears a bronze model of No. 1, *Locomotion*, and the years 1825–1925 on each side, with the following inscription :—

"To the memory of Five Pioneers of the first public Railway in the World : Thomas Meynell (chairman), of Yarm, Benjamin Flounders, Jeremiah Cairns, Richard Miles, Thomas Miles. Erected by the inhabitants of Yarm, 1926."

* * *

The London Railways Athletic Association held their fifteenth annual five-miles cross-country championship and second individual and group championship recently, at the grounds of the R.A.F. Records Office, Ruislip, Middlesex. There were 237 individual entries, of whom 140 completed the course. Mr. R. H. Selbie, C.B.E., General Manager, Metropolitan Railway, acted as starter. Among those present were :—

Mr. W. G. Pape, Mr. W. F. Smith, Mr. G. Hussey, Mr. W. F. Holt, and Mr. A. F. Cox. The officials of the Association included Mr. G. W. Carter, chairman of committee ; Mr. D. H. F. Meacock and Mr. J. V. A. Kelly, hon. stewards ; Mr. P. W. Holdaway, hon. general secretary ; and Mr. A. H. Bell, press steward.

At the conclusion, Mr. R. H. Selbie presented the trophies and medals, including a cup presented by Sir Felix Pole for the first G.W.R. man home, which was awarded to B. D. Hammond, and expressed the thanks of the Association to Wing-Commander J. W. Cordingley and Mr. Edwards, of the R.A.F., for their kindness in entertaining.

In connection with the extension scheme now being carried out of rebuilding and reorganising Crewe Works, L.M.S.R., it is pointed out that when the alterations are complete the new works will be the largest locomotive building and repairing establishment in the country, covering 160 acres. The new erecting shop will measure 850 ft. by 193 ft., and will be equipped with two 50-ton and two 10-ton high-speed cranes in each of its three bays. The steelworks will have two furnaces of 45 tons capacity, and two of 70 tons, which will replace several old hand-charged furnaces. The works will be furnished with a mechanical charger for feeding the furnaces, and six new revolving gas machines. The use of compressed air is being extended by the provision of two air compressors of 2,000 cubic ft., each requiring a 430-h.p. motor for driving.

* * *

The gas works which supply the town of Crewe had become inadequate, and a large reconstruction scheme has been started. This entails the pulling down of the old retorts and their replacement by modern horizontal retorts, the provision of a 1,000,000 cubic ft. gasometer, of new purifying and exhausting plant, and the laying out of considerable mileage of new mains. As extended, Crewe Works will have an annual output capacity of about 100 new engines, 1,500 complete overhauls and heavy repairs, and 350 new boilers. They will rank as the largest locomotive-building establishment in the country, covering 160 acres.

* * *

Competing in the L.M.S.R. Temperance Union Musical Festival, the Derby Male Voice Choir was selected to sing in the final competition in Manchester on Saturday, March 27, where they were awarded a first prize, with 91 points. The North Staffordshire Section choir, from Stoke-on-Trent, obtained second place with 88 points, Kilmarnock following with 87, Manchester District 77, and Carlisle 76 points. Dr. A. J. Silver, of Birmingham, and Dr. H. L. Read, of Warrington, were the adjudicators.

* * *

The original seal of the old Canterbury & Whitstable Railway Company, bearing the date 1825, and a design of two wagons being drawn along the rails by a horse, has been given to the Canterbury Museum. It was found among a load of old metal, reports *The Times* correspondent.

* * *

Now that Canvey Island, at the mouth of the Thames, has obtained urban powers, a

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local agitation is in progress for a passenger and goods railway service, on the ground that such a service "would induce more City men to live there, encourage building, and facilitate the erection of factories."

* * *

PROPOSALS for the construction of an underground tube railway in Manchester are again to the fore, and a report thereon has been prepared for presentation to the Manchester City Council. It is suggested that the tube, if built, would have a length of about 14 miles, and that a total cost would be involved of over £4,000,000.

* * *

THE L.N.E.R. have placed contracts with Gabriel, Wade & English Limited, Lambeth; Calders Limited, Rotherhithe; The Canusa Trading Co. Ltd., Old Broad Street; and Wm. Christie & Co. Ltd., Charlton, for 672,000 sleepers and sleeper blocks for the maintenance of the permanent way.

* * *

THE L.N.E.R. announce that they have placed orders with the following firms for 1,910 tons of steel fish plates:—Dorman, Long & Co. Ltd., Middlesbrough; Cammell, Laird & Co. Ltd., Sheffield; Bolckow, Vaughan & Co. Ltd., Middlesbrough; Barrow Hematite Steel Co. Ltd., Laurence Pountney Hill, E.C.; The Cargo Fleet Iron Co. Ltd., Middlesbrough; and William Beardmore & Co. Ltd., Glasgow.

* * *

THE February number of the *Bulletin of the International Railway Congress Association*, published in Brussels, includes Mr. J. F. Gairns' usual annual article on "British Locomotives in 1925—Designs and Work."

* * *

THE L.N.E.R. have placed an order with W. Beardmore and Co. Ltd. for 20 suburban tank engines, and with Earle's Shipbuilding Co. Ltd. for a new cargo steamer, to be named *Sheringham*, and intended for service between Harwich and Continental ports.

* * *

THE Sentinel Waggon Works Limited have received orders for two Sentinel-Cammell type A 52-seater rail-coaches, from the London and North Eastern Railway, and for a C.E. type 20-ton Sentinel shunting locomotive from the Great Western Railway.

* * *

MR. F. A. PLANT, writing from Greenock, points out that, in the list of named locomotives on the North British section of the L.N.E.R., two of the names include clerical misspellings. Thus, No. 9298 should be *Glen Sheil*, and not *Glen Shiel*, and No. 9504, *Glen Aladale* instead of *Glen Alladale*.

* * *

WIMBLEDON and District Model Railway Club fixtures for May are: May 3: Lecture on "15-in Gauge Locomotives," by Mr. H. Greenly, A.I.Loco.E.; May 17: Test track operation and demonstration on "Brazing," by Mr. F. A. Evans; May 22: Visit to the Air Port of London (Croydon). On March 1 a very interesting lecture on the historical aspect of "Continuous Brakes" was given by Mr. O. C. Thorpe, of the Westinghouse Brake Company. A visit to Messrs. Drummond Lathes Limited, at Guildford, afforded members an insight into the organisation and activities of this well-known firm.

* * *

THE directors of the London and North Eastern Railway Company have appointed Captain R. Davis to be Marine Superintendent at Parkeston Quay (Harwich), in succession to Commander W. H. Coysh, who retired from the service on December 31, 1925. Captain Davis, who was formerly Marine Superintendent, Manager and Secretary of Great Eastern Train Ferries Limited, will, in his new appointment, be responsible to Mr. A. L. Gibson, the London and North Eastern Company's Continental Traffic Manager (South), for the working of the fleet of steamers sailing between Harwich and the Continent, and for the operation of Parkeston Quay.

* * *

ONE of the standard main-line engines shown at the Dunedin Exhibition has been named *Passchendaele*, and bears two brass tablets enclosed in scrolls of laurel and fern-leaves and lettered, "In memory of those members of the New Zealand Railways who fell in the Great War." The memorial tablet was "unveiled" by the Governor-General, the starting of an electric motor, fitted to cause the engine wheels to revolve, releasing the Union Jacks which covered the tablets.

* * *

A MEETING of the L.N.E.R. Great Central Section Lecture and Debating Society, held at Nottingham on January 9, was addressed by Mr. Cecil J. Allen, M.Inst.T., on "The Manufacture of Iron and Steel for Railways." Mr. S. L. Murgatroyd, Permanent Way Engineer, Southern Area, L.N.E.R., occupied the chair. Mr. Allen preceded his lecture by giving an organ recital for an hour on the organ of the hall, vocal solos being also contributed by Miss Stubbs, daughter of a L.N.E. railwayman at Sheffield.

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In connection with Mr. Household's article on the Glyn Valley Tramway published last month, acknowledgment should have been included of the assistance rendered to the writer by Mr. A. Wynne and other officers of the Glyn Valley line.

* * *

At Easter the S.R. repeated the practice of operating through trains to coast resorts from Croydon independently of those from the London termini.

* * *

Rings are being removed from relief line signals on the L.N.W. section of the L.M.S.R.

* * *

Conveying American and Continental Hotel Managers from Manchester to London on Wednesday, April 14, the first L.M.S. special train, weighing 326 tons, covered the 189 miles to Euston in 199 minutes. The two specials were worked, respectively, by "Claughton" locomotives named "Private E. Sykes, V.C.," and "Private W. Wood, V.C."

* * *

The following L.M.S.R. appointments have been approved by the directors :—

Mr. J. C. Marquis, to be Divisional Solicitor, Manchester.

Mr. M. Saunders, of Manchester Control, to be Stationmaster and Yard Master, Rose Grove.

Mr. J. A. Atkinson, Goods Agent at Camden, to be Goods Agent at Poplar, Victoria Docks, Thames Wharf, and Canning Town.

Mr. W. H. Saunders (of Poplar, L.N.W.) to succeed Mr. Atkinson as Goods Agent, Camden.

Mr. R. Howell, Goods Agent, Wolverhampton (L.N.W. Section), to be Goods Agent, Wolverhampton (L.M.S.).

* * *

We are officially informed of the following appointments on the Central Argentine Railway :—

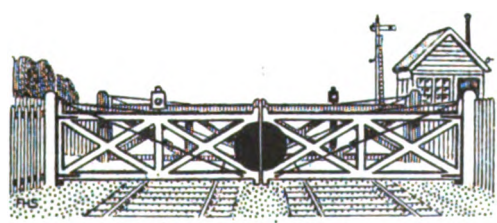
Mr. Howard Williams has been offered and accepted a seat on the board left vacant by the recent death of Sir Joseph White Todd. Mr. Howard Williams will retire from his present position as General Manager on June 30 next.

Mr. Ronald Leslie, Traffic Manager, has been appointed to succeed Mr. Howard Williams as General Manager.

Mr. George Frederick Sampson, Assistant Traffic Manager, has been appointed to succeed Mr. Ronald Leslie as Traffic Manager.

* * *

The death occurred on Thursday, March 18, of Mr. J. G. Bell, of Melton Constable, Norfolk. Mr. Bell had been in the railway service for over fifty years, gaining his first railway experience on the North Eastern Railway. He afterwards served in the Locomotive Running Department of the Midland & Great Northern Joint Railway and its component companies for 44 years. He was appointed an inspector in 1904, and locomotive foreman in 1917, being in charge of the Locomotive Running Departments at Melton Constable and Cromer. Mr. Bell was the grandson of the late Mr. Thomas Bell, C.E., who commenced his railway career in 1828, being civil engineer to the old Clarence and West Hartlepool Harbour Railway and district engineer to the North Eastern Railway for 47 years.



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Under this heading will be inserted short references to news items relating to locomotive engines and their duties. It must be understood, however, that information as to the stations of particular engines cannot be given, for the reason that, before the date of publication, transfers may have taken place, while lists of engines, &c., debarred from "The Why and the Wherefore" section, cannot be included under this heading. With this understanding, notes as to matters thought to be of general interest will be welcomed.

L.M.S.R.

New Midland type 0-6-0 engines are in service on the Midland section up to No. 4220. On February 25 a "Claughton" class locomotive worked to St. Pancras on an up Manchester express, arriving at 1.47 p.m., and returning on the 2.25 p.m. down Manchester.—[A. E. CLARKE.]

Many L.N.W. section locomotives are now running with the new power classification figures on the cab sides in a similar position to those on Midland section engines. Classes and corresponding numbers so far noted are "Precedents," 1; "Experiments," "George the Fifths," and "Precursors" (non-superheated and superheated), 3; "Prince of Wales," 4; and "Claughtons," 5. Presumably the "Renowns" are classed 2. No L.N.W. section goods engines, as yet, have had their power classification numbers added.—[C. R. P. and J. TWELLS.]

L.N.W. section "Claughton" No. 1131, *Lord Faber*, and "Prince of Wales" No. 1084, *Shark*, have been re-numbered 5912 and 5656 respectively. The former engine is painted black and stationed at Crewe, while the latter is in L.N.W. livery and stabled at Rugby.—[J. TWELLS.]

"Prince of Wales" No. 1316 worked for a time on the Midland main line, but is now at Monument Lane (10M) depot, and working between Birmingham, Manchester and Liverpool. Midland 0-4-4T No. 1253 and 0-6-4T No. 2036 have been working on the Cannock branch between Walsall and Rugeley (T.V.). These two engines presumably belonged to the Midland shed at Pleck, which is now closed, and it is likely they are now stationed at the Walsall (Ryecroft) L.N.W. shed.—[C. R. P.]

A goods train of 30 wagons was recently seen at Kensal Rise, N.L. section, headed by three N.L. type 0-6-0T's Nos. 2886, 2894 and 2650. N.L. 4-4-0T No. 2830 has been renumbered 6466, but still retains its old N.L. livery. 0-6-0T No. 7514 (formerly No. 2875) has also appeared in a similar condition.—[S. H. BEAVER.]

The following is a list of scrapped Midland double-framed goods locomotives: Nos. 2301, 2303, 2308, 2310, 2383, 2387, 2389, 2390, 2391, 2394–99, 2405, 2406, 2409, 2410, 2412, 2418, 2419, 2424, 2426, 2428, 2429, 2430, 2435, 2438, 2440, 2447, 2449, 2461, 2462, 2464, 2466, 2473, 2504, 2506, 2517, 2518, 2521, 2522, 2524, 2529, 2530, 2534, 2537, 2541, 2546, 2547, 2548, 2575, 2585, 2591, 2664, 2676, 2681, 2696, 2712, 2765, 2805, 2848, 2857, 2866, 2952, 2997, 3033, 3034, 3053, 3059, 3093, 3095, 3106, 3196, 3384, 3557 and 3761. Smith compounds returned to Manchester include Nos. 1022, 1036, 1045.—[A. COPSON.]

A "Sentinel-Cammell" steam rail motor made its first appearance at Oxford, L.N.W. section, during February. It did not carry a running number, but the works number was 6177. Midland type locomotives recently noted at Oxford include Nos. 4140 (shed 4), 4111 (shed 8), 4073 (shed 3), 4115 (shed 4), and No. 4106.—[R. ABBOTT.]

Twenty locomotives of the Caledonian 4-6-0 No. 60 class are stated to be under construction at St. Rollox shops. They are numbered from 14,630. No. 14,630 has been seen on local and semi-fast trains in the Glasgow area, and No. 14,631 on an express goods train near Beattock. G. & S.W. section 0-4-2 No. 17,047 is stationed at Perth, and is usually station pilot at Perth General on the H.R. section.—[W. B. G.]

G. & S.W. small 0-6-0 engine No. 17,505 has been noted at Perth.—[J. A. HODGE.]

No. 4172 is the latest Crewe built 0-6-0 to be delivered to Derby for service on the Midland Division. The sheds to which these

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engines are being allocated include Burton, Birmingham and Gloucester. "Experiment" class 4-6-0 No. 1994 *Scottish Chief* has been rebuilt with a standard Belpaire boiler (non-superheater). The similar but superheated engine, No. 2624, is stationed at Huddersfield (shed 20), while No. 2630 (non-superheater) is at Warrington (shed 23). These engines still carry the No. 2 classification for traffic purposes. No. 675 *Adjutant*, of the "Precursor" class, has been converted to "George V" class (superheater). No. 1226 (class "B" compound) and No. 1873 (class "D" simple) have been converted to class "G1" (superheater). As an indication of the usefulness of this latter class, it may be mentioned that there are now no fewer than 313 "G1's" at work, of which 170 were newly built, the remainder being all conversions from other types. Additional 18-in. goods rebuilt with Belpaire boilers include Nos. 1264, 1743 and 2323. One of the 19-in. goods, No. 1645, is now running fitted with brake apparatus working on the bogie wheels. Further withdrawals for scrapping are as follows:— 6 ft. S.L. class, Nos. 764 *Shap* and 1045 *Whitworth*; 6 ft. 6 in. S.L. class, No. 2180 *Perseverance*; 7 ft. "Renown" class, No. 1962 *Aurora*; 4 ft. 6 in pass tank, Nos. 390 and 980; 5 ft. 5 in. N.L. pass. tank, No. 2831; 5 ft. Spec. D.X. goods, Nos. 3096, 3097, 3135, 3293 and 3514; and 2 ft. 6 in. Shunter No. 3013. No. 2104, a Midland (Tilbury Section) 4-6-4T, is at present undergoing repairs at Crewe. In response to a request from two Birmingham readers I append herewith a list of the remaining Webb compounds:— 4-4-0 type: Nos. 1944 *Victoria and Albert*, and 1974 *Howe*; 0-8-0, class "B": Nos. 826, 918, 1051, 1061, 1233, 1281, 1282, 1370, 1547, 1555, 1881, 2561 and 2565; 2-8-0, class "E": Nos. 18, 905, 1017, 1042, 1222 and 2558; 2-8-0, class "F": Nos. 352 and 1273.

The following changes have recently been made in the Western "A" Division (old L.N.W.) shed list:—No. 11, previously blank, is now Devon's Road, N.L. Section; No. 12, formerly Burton, is now Birkenhead Docks, Wirral Section; No. 36, previously blank, is now Carnforth (was 27c), whilst Nos. 39 and 40 have been allotted to Barrow, Furness Section and Stoke-on-Trent, N.S. Section respectively. This latter also includes Burton, which until recently was No. 12.—[G. WILLIAMS.]

For the Cup Final at Glasgow on April 10, specials from Glasgow (Central) to Mount Florida (Cathcart Circle line) were worked by Caledonian 0-4-4 tank and 0-6-0 and 4-4-0 tender engines, together with three L.M.S. 0-6-0 tank engines, a G. & S.W. 0-6-0 No. 17477, and Highland 4-6-0 No. 58, *Darnaway Castle*. No. 14630, "60" class was noted fitted with water-scoop on the tender.—[J. M'INNES.]

On Easter Monday, Midland type 0-6-0 tank engines Nos. 7126 and 7127 worked vacuum-fitted trains from Glasgow to Gourock, piloted by Caledonian 0-6-0 tender engines, Westinghouse-fitted only. New 4-6-0's of "60" class now in service include Nos. 14630, 14632–3–4.—[J. F. MCEWAN].

L.N.E.R.

Several new superheated 0-6-0's have recently been seen at Glasgow. They appear to be numbered from 1400 upwards, and presumably are Darlington built. The turbine locomotive constructed by the North British Locomotive Company and exhibited at Wembley in 1924 recently ran a trial trip over the N.B. Glasgow to Edinburgh line, with two coaches.—[W. B. G.]

"Director" class locomotive No. 6387 has been temporarily withdrawn from service for side frame alterations and to have nameplates affixed.—[J. A. HODGE.]

4-4-2's Nos. 3288, 4405, 4409, and 4461 are fitted with Ross "pop" safety valves. 0-6-2T No. 3190 has been recently stationed at Hatfield, together with N.7 class 0-6-2's Nos. 409, 421, 460, 471, 473, 912, 913, and 916.—[G. RAY and J. MIRAMS.]

G.W.R.

On the latest 2-6-0 mixed-traffic locomotives the steam pipes are carried through the walls of the smokebox, as in the case of the 2-8-0 mixed-traffic engines of the 4700 class. No. 6368 is one of the new engines so fitted.—[C. B. HEWITT.]

"Duke of Cornwall" class 4-4-0 No. 3255, *Excalibur*, is at Old Oak Common sheds.—[G. RAY and J. MIRAMS.]

S.R.

Several of the new 4-4-0's are in use on the S.E. & C. section and also on Ashford Brighton trains. Nos. 754A and 757A have been so noted. They are fitted with large-pattern cabs with side windows, and carry a boiler pressure of 180 lb. per square inch. In general appearance they are similar to Mr. Maunsell's rebuilds of the D1 and E1 classes. The tenders are of the same pattern as those running behind the "Moguls."—[F. A. G., J. L. LYNN, E. L. P. QUESTED.]

One of the new 4-4-0's recently worked a 340-ton train from Folkestone to Charing Cross in 80 min., 72 miles. These engines have also been noted on the Brighton Section.—[T. H. DONOHUE.]

Several Western section locomotives of the

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Drummond large-boilered, superheated 415 class have been working on local trains between Dover and Faversham. Among those noted on this work are Nos. 417, 419, 424, 425, 431, and 433. All are fitted with the new type chimney and six-wheeled tenders. Small-boilered superheated Drummond 4-4-0's Nos. 304 and 310/3 have been regularly working through Faversham on Kent Coast expresses, taking turns with either Wainwright 4-4-0's or Mr. Maunsell's rebuilds.—[C. L. WARREN-SMITH.]

Stirling 0-4-4T's Nos. 40, 352, 417, and 422 recently worked away in pairs from West Marina shed *en route* for Brighton.—[" CURIOUS."]

Kirtley 0-4-4T No. 660A is working in the Brighton section London area, and with Nos. 664A, 665A, 668A, 671A, 672A and 706A is stationed at Epsom Town shed. 0-6-0T No. 751A, formerly a Brighton "Terrier," No. 74 ; *Waddon*, sold to the S.E. & C.R. in 1904, is yard engine at Battersea Locomotive Depot, Brighton section. " King Arthur " class engines now work the boat trains via the Maidstone East line.—[E. H ROBBINS and IAN C. ATTEN.]

L.B.S.C. section 4-4-0 locomotive No. 69B has been fitted with an extended smokebox. 0-4-2 No. 184B, formerly *Stroudley*, is now running in the new colours without the name.—[J. RICHARDSON.]

S.E. & C. section Stirling 4-4-0's from Reading shed now work trains over the L.S.W. section into Waterloo. A Guildford L.S.W. section 5-ft. 7-in. 4-4-0 engine also works a Wednesday's only train into Charing Cross via Redhill, returning in the evening. Several 0-6-0's from the same section regularly work night goods trains through to Redhill S.E. & C. section. The lamp brackets fitted on top of the smokebox on some of the 4-6-0 engines are being removed to top of smokebox door, after the style of Brighton " Atlantics." Latest superheated 4-4-0's on L.S.W. section are Nos. 122, 285, 288, 725, and 728. 0-6-0's Nos. 327 and 690 are also now superheated. 4-4-0's Nos, 463, 466, 467, 469, and 470 have six-wheeled tenders and are stationed at Fratton. No. 469 has a Urie boiler. With further reference to the 0-4-0 ST No. 734, *Clausentum*, mentioned in these columns in the March issue, she was previously numbered 0457. No. 0458, *Ironside*, retains its name-plate and is at present at Eastleigh. No. 0408 is now withdrawn, but used to be employed on the duties now performed by No. 734 at Guildford.—[TINTAGEL and PORTMUTHIAN.]

L.S.W. section 4-6-2T No. 520 now works regularly to Reading. The following " King Arthurs " from Bournemouth have worked into Oxford : Nos. 783–788, 791, and 792.—[R. ABBOTT.]

During February Ashford 2-6-4T No. 790, appeared on the L.S.W. section, working between Waterloo and Woking.—[T. D. THOMSON.]

2-6-0 locomotives Nos. 830, 832 and 843 (all newly painted after overhaul at Eastleigh shops) and 864 and 0-6-0 No. 291A have been noted working in the Portsmouth area. No. 291A was on a special naval train. Engines from Fratton shed continue to work between Brighton and Bournemouth, and also Brighton to Eastleigh via the direct line between Farlington Junction and Cosham Junction. Locomotives on these trains are chiefly Brighton section 4-4-0's of the 205 and 316 class.—[PORTMUTHIAN.]

Eastern Section locomotives now occasionally work into Waterloo station from the Reading line. Nos. 117A and 208A have thus been noted.—[J. A. DREW.]

No. 754, now 4-4-0, was recently noted at Canterbury, and No. 757 at Ashford.

Three-cylinder 2-6-4 tank engine No. 890, *River Frome*, has been working Eastern section main line trains.—[R. G. BOLTON.]

We hope to deal in our next issue with the heavy and interesting correspondence sent in in regard to the Adams and Drummond locomotives of the late London and South Western Railway.—[ED. RAILWAY MAGAZINE.]

Irish Railways.

Two further D. & S.E. section 4-4-2T's have been returned to that section. These are Nos. 458 and 459, previously Nos. 52 and 54 respectively. G.S.R. 2-6-0 No. 376 is now in service, and M.G.W. engines repainted and renumbered include 0-6-0 No. 643, formerly 46, and 4-4-0's Nos. 531 and 549, formerly Nos. 4, *Cyclops*, and 128, *Majestic*. G.S. & W. 4-4-0 No. 309 has been running on the M.G.W. section.—[K. A. MURRAY.]

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THE RAILWAY MAGAZINE.

11.10 a.m. WEST OF ENGLAND EXPRESS, G.W.R.

FOUR-CYLINDER 4-6-0 LOCOMOTIVE No. 4022, "KING WILLIAM."

From a Photograph by H. Gordon Tidey.

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Photo.] STROOD STATION, LOOKING NORTH. [*H. L. Hopwood.*

The North Kent Line of the Southern Railway.

BY HAROLD L. HOPWOOD.

ALTHOUGH the first trunk railway through Kent—the South Eastern—was authorised in 1836, proposals for lines from London to the South-East Coast go back at least ten years earlier. One such scheme, known as the Kent Railway, was for a line via Greenwich, Woolwich, Dartford, Gravesend, Rochester, Faversham and Canterbury to Dover, practically following the route of the Dover Road, but, owing to local opposition, no more was heard of it for some years. Meanwhile, the Canterbury and Whitstable, London and Greenwich, London and Croydon, and London and Brighton Railways had all been opened, and, finally, the South Eastern main line was completed from Red Hill to Dover in February, 1844, a branch from Paddock Wood to Maidstone following in September of the same year.

At that date, the whole of North Kent being still without railway communication, the South Eastern Railway next gave attention to that district, reviving, in part, the scheme of the now defunct Kent Railway. The Thames and Medway Canal (incorporated in 1800) was already in existence between Gravesend and Rochester, but not being a financial success, was purchased in 1845, and the southern half, from Higham to Rochester, converted into a railway. This portion of the canal was remarkable for the fact that it was carried by two tunnels, over two miles long, through the high ground which separates the valleys of the Thames and Medway. Commencing at Gravesend station, the railway followed the canal as far as Higham, south of which point the waterway was abandoned, the railway occupying its old course through the two tunnels already mentioned, and terminating a short distance away at Strood station. Opened on August 23, 1847, the Gravesend and Rochester Railway was worked by the South Eastern Railway, although it was then isolated from the rest of that system.

In 1845, the last mentioned company had obtained a lease of the London and Greenwich Railway, and in the following year they were authorised to construct the North Kent Railway, via Woolwich

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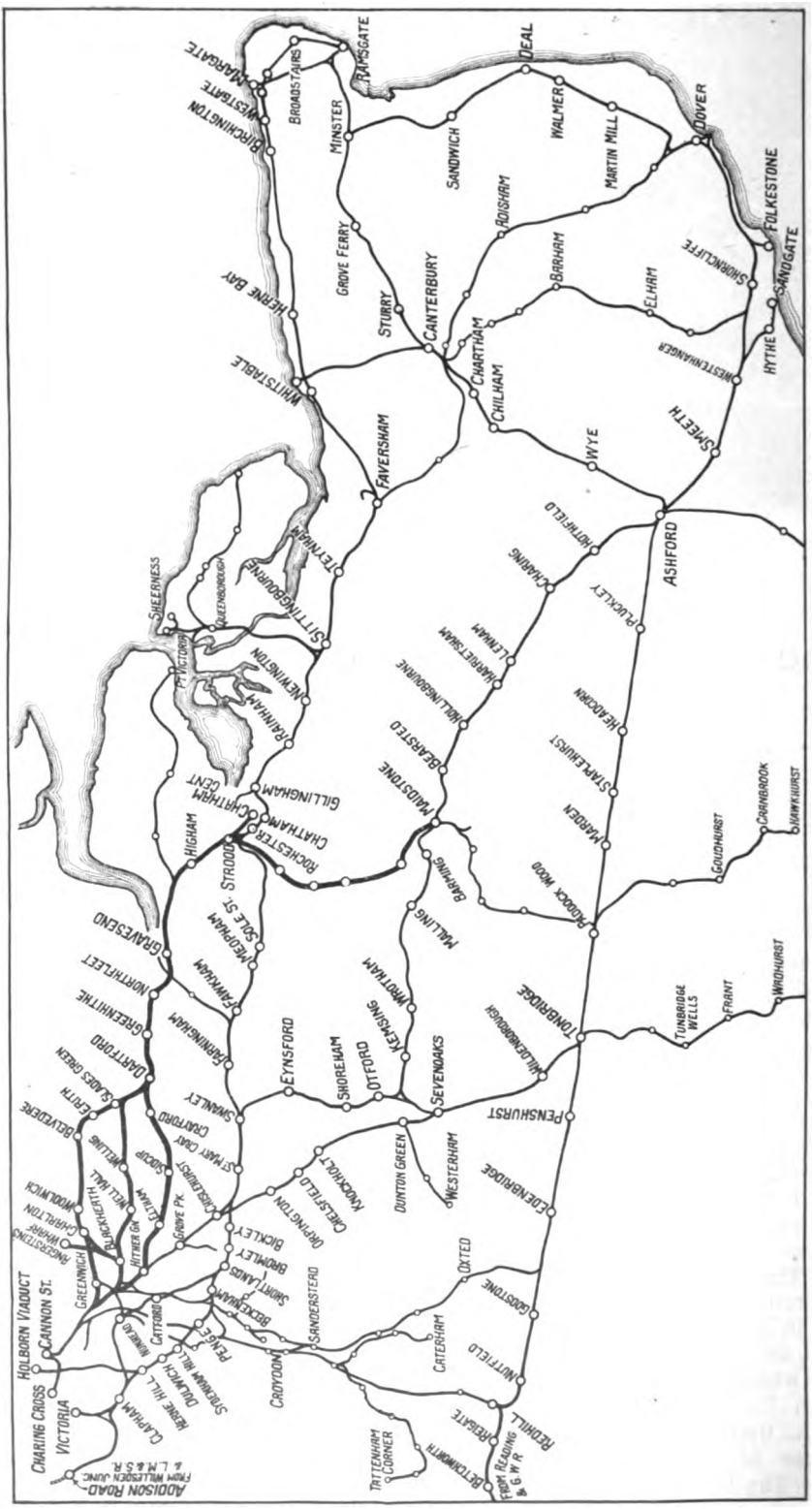

PLAN OF NORTH KENT AND ASSOCIATED RAILWAYS IN RELATION TO REMAINDER OF EASTERN SECTION, SOUTHERN RAILWAY.

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and Dartford, to Gravesend, where the Gravesend - Rochester line would be joined. At the London end, Greenwich had been proposed as the starting point, but the authorities at the Royal Observatory in Greenwich Park objecting on the grounds that their instruments would be disturbed by vibration set up by the trains, the North Kent Railway, which had been designed as a continuation of the Greenwich Railway, had, instead, to be diverted to the south of Greenwich Park. As constructed and opened on July 29, 1849, the line commenced at North Kent Junction, half-a-mile-north of Deptford, on the Greenwich Railway, and ran via New Cross, Lewisham and Blackheath, so as to avoid Greenwich Park and the Royal Observatory. At Blackheath it turned north to Charlton and continued thence through Woolwich, Erith and Dartford, to Gravesend, where it joined the line to Rochester (Strood station), which had already been in operation for two years.

ERITH STATION, S.E.R., IN 1865.

Of the North Kent extension lines, the first was the goods branch (73 chains) leading from near Charlton to Angerstein's Wharf. Opened in 1852, this line had been constructed as a private undertaking by an Act of Parliament granted to Mr. Angerstein, proprietor of the Thames-side wharf of that name, in the previous year, and was leased to, and worked by, the South Eastern Railway, whose property it afterwards became.

The North Kent line was next extended, on June 18, 1856, from Strood, along the valley of the Medway, to Maidstone, where it joined the branch from the main line at Paddock Wood which had been in existence since 1844. In April, 1858, Strood station was made the starting point of a new line, through Chatham, to Faversham. This railway, the East Kent, was the small beginning of the system which soon developed into the London, Chatham & Dover Railway and afterwards became such a formidable rival of the South Eastern Railway.

In July, 1865, the first portion of the Tonbridge Direct line, from St. John's to Chislehurst, was opened, and from Hither Green Junction on this section, a new line was constructed through Sidcup to join the North Kent line at Dartford Junction. Known as the North Kent Loop, it became available for traffic on September 1, 1866.

At that time, and for some years later, Greenwich station was still a terminus, but the requirements of the district necessitated an extension towards Charlton, there to join the North Kent line, and, the Royal Observatory authorities withdrawing their objection which 30 years earlier had caused the railway to be deviated from its intended course, the extension was duly constructed. Curiously enough, it was opened first (on January 1, 1873) from the Charlton end and terminated at Maze Hill, and it was not until February 1, 1878, that the Maze Hill-Greenwich section was completed. The terminus of the London and Greenwich Railway then disappeared, but the old offices of that company were re-erected and still serve a useful purpose.

During the next few years, the intense rivalry between the South Eastern and the London, Chatham & Dover Railways

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resulted in the former constructing two competitive lines in the North Kent district. The first of these, a single line from Hoo Junction to Port Victoria, opened on September 11, 1882, was intended to compete for Continental traffic with the Queenborough route which the London, Chatham & Dover Railway had opened a few years earlier. Between Port Victoria and Sheerness a steam ferry plied in an endeavour to attract Sheerness passengers to the South Eastern route. The second competitive line, opened on March 1, 1892, was that from Strood to Chatham, but it proved an expensive and useless extension, for it was carried across the Medway by a long four-span viaduct and then stopped short at Chatham Central station, only 1¼ miles from Strood. It paralleled the London, Chatham & Dover Railway and had an intermediate station at Rochester.

On May 1, 1895, occurred the opening of the Bexleyheath line, which, extending from Blackheath to Crayford Creek Junction, with a northern spur towards Slades Green, provided a fourth route from London to Dartford and stations beyond. The three older and alternative routes are (1) the original line *via* Blackheath and Charlton, (2) *via* Hither Green and Sidcup, and (3) *via* Greenwich and Charlton.

Although there are no severe gradients on the North Kent line, the engineering works are of an exceptional nature, consisting chiefly of cuttings and tunnels. Between Blackheath and Gravesend the line is almost continually in cuttings, which at some places are of considerable depth (*e.g.*, east of Dartford), and in the London area they are mostly lined with retaining walls. In addition to five short tunnels between Charlton and Woolwich Arsenal, there is the Blackheath tunnel of 1,681 yards, as well as the two between Higham and Strood, which measure 1,530 yards and 2,329 yards respectively. These were constructed by the old Thames and Medway Canal Company, and as a distance of only about 50 yards separates them, it may be said that the length of railway between Higham and Strood (2 miles 50 chains) is practically all in tunnel. The old London & Greenwich Railway, which was opened throughout in 1839, and may now be included as part of the North Kent route, is noteworthy for the fact that in its length of 3¾ miles it is carried above ground level on no fewer than 878 brick arches.

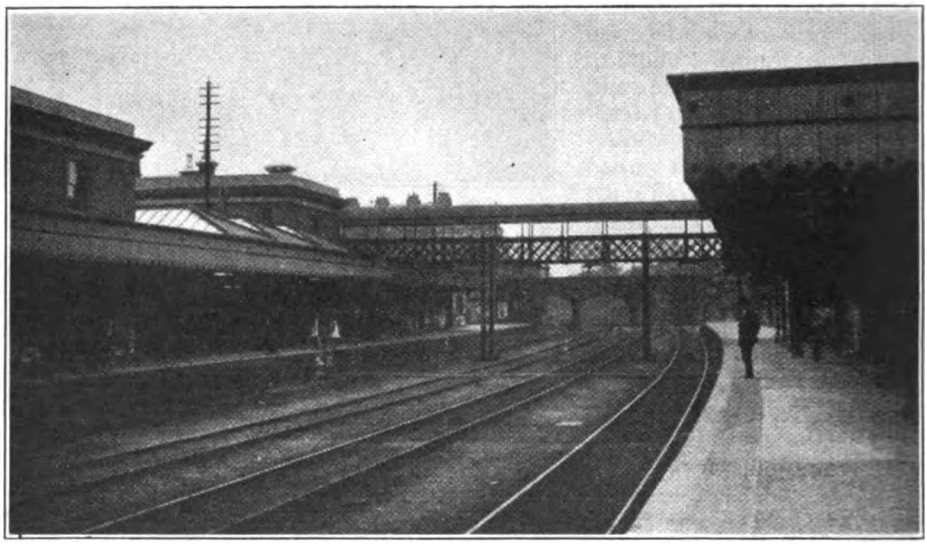

Photo.] CENTRAL STATION, GRAVESEND. [*H. L. Hopwood.*

The extension from Greenwich to Charlton, made between 1873 and 1878, was a difficult undertaking, for the line had to be carried through a tunnel under the town of Greenwich. This circumstance accounts for the sharp fall (1 in 60)

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encountered immediately east of Greenwich station, and the longer rise at the further end through Maze Hill.

Serving such places as Greenwich, Woolwich, Dartford, Gravesend and Strood, the North Kent line has always carried a very large number of passengers; in fact, most of the South Eastern's heavy suburban traffic in the early days originated at stations on this section. Some carriages built for this service in 1849 were remarkable at that date in being 9 ft. wide, and they remained in traffic for over fifty years.

With the Thames on one side of the line, and the main road to Dover on the other, many new industries have developed in recent years, and to accommodate the traffic to and from the factories and riverside works which have been built, a number of private sidings are laid down. At Woolwich, traffic with the Royal Arsenal and Dockyard respectively has always been a considerable item. During the four years of war, over one million wagons were exchanged between the railway and the Arsenal, whilst at the Dockyard, 300,000 wagons were similarly dealt with. In the district between Dartford and Gravesend the manufacture of Portland cement is a very old, as well as a most important, industry, and the majority of these cement works have siding accommodation with the railway. At Swanscombe and elsewhere there is quite a network of narrow-gauge private lines, some of which date back 100 years.

Most of the stations on the line are the original buildings, brought up to date, but Woolwich Arsenal has been renewed, and Slades Green is an additional station opened about 25 years ago. Gravesend and Maidstone each have four through roads, with two platforms serving the outer lines. There was formerly a similar arrangement at Greenwich, but the two centre roads have now been removed. At Strood, the up platform is an island, the outer face of which accommodates trains from Maidstone. On account of the cramped situation at the south end, the lay-out is rather unusual, the up Chatham and Maidstone lines having separate platforms. The sharp curve to the Chatham main line was formerly the South Eastern's Chatham Central line of 1892. This was closed on September 30, 1911, and the Strood end utilised to form a widening of the Chatham main line through Rochester; the Central and Rochester (S.E.) stations, and the line east of the Medway viaduct becoming disused. The London, Chatham and Dover line from Strood to Rochester (opened in 1858) disappeared when these alterations were made.

Dartford is the terminating point of most suburban trains, and the four routes from London are, in common with other Southern Railway lines in the suburban area, now being converted for electric traction.

In the early days, the type of engine usually employed between London, Strood and Maidstone was the Cudworth double-framed 2-4-0. As no fewer than 118 of this class were built between 1857 and 1875, they were naturally to be seen on all parts of the system. In 1879-1881 Mr. J. Stirling introduced a 4-4-0 class, and although not built specially for the North Kent line, these engines were very frequently seen on that section. There were only twelve of them, and they disappeared during 1907-9. The cylinders were 18 in. by 26 in., and the coupled wheels 6 ft. in diameter. The 4-4-0 engines of the "240" and "440" classes now work the majority of the through trains.

The locality served by the line is associated with the names of two men, each of whom enjoyed fame in a different way. It is not generally known that the Cornishman, Richard Trevithick—one of the pioneers of the locomotive—is buried at Dartford, having died at the Bull Inn there, in pathetic circumstances, in April, 1833. Higham was the "home" station of the great novelist, Charles Dickens, during his residence at Gads Hill Place (1856-1870).

The original Thames and Medway Canal—the nucleus of the North Kent Railway—now extends a distance of 3 miles 8 chains only, and under the name of the Gravesend and Higham Canal is still owned and maintained by the Southern Railway.

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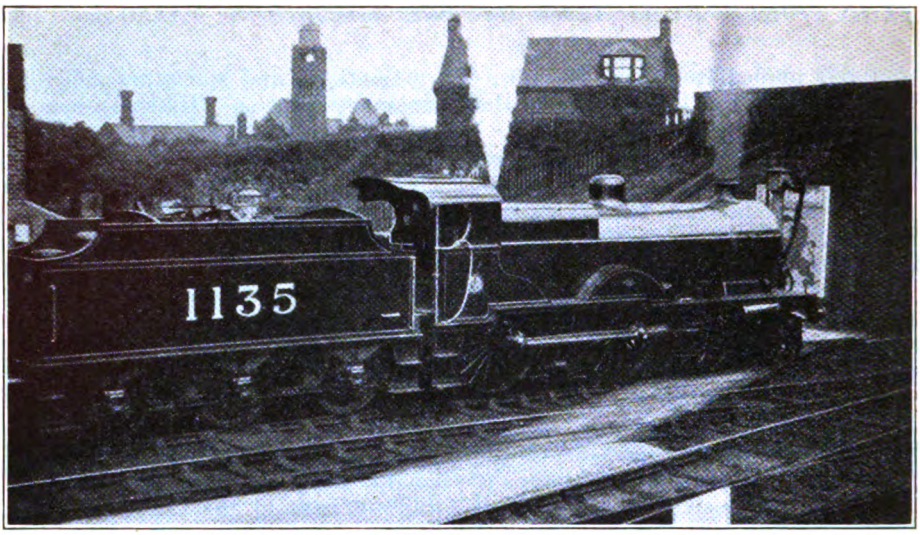

Photo.] [*J. J. Cunningham.*

NEW L.M.S.R. THREE-CYLINDER COMPOUND 4-4-0 LOCOMOTIVE No. 1135 AT ANNAN.

The Express Locomotive and its Limitations.

By L. G. A. SIMS, M.Sc., Eng.

ADMIRATION for the steam locomotive has found expression in spoken word and story, even in poetry and in music, and although more than a hundred years have now passed since its progenitor astonished the world, the locomotive can still draw from the waiting crowd at any railway station an eager group of enthusiasts who are thrilled in its presence. There is, and there will always be, a bond of affection between it and its admirers which does not exist in the same degree towards the electric locomotive. It is not necessary to enlarge upon what one might call the sentimental side of locomotive operation. The fact is that no other mechanism arouses man's enthusiasm in the same universal way.

But whilst its abilities are remarkable, and whilst in general it executes the task for which it was designed extremely well, it has many inherent weaknesses which prevent its being an ideal machine, either in theory or in practice. Thus, we may marvel at the extraordinary steam generating abilities of its boiler. But, to generate steam at the high rate necessary to feed its cylinders, while producing their 900 or 1,000 h.p., the rate of combustion in its firebox is so high as to make it one of the most wasteful modern producers of power. To obtain the necessary draught upon the fire with that high rate of combustion, the steam is released from the cylinders while still capable of producing many additional horse-power, and, in addition to this, the heavy blast pulls much useful coal from the fire, to be discharged unused through the funnel. Its capacity for meeting overloads is limited by the ability of its boiler to generate steam, and, due to the unhappy limitations forced upon its designer by the British loading gauge, the size of the boiler has already almost reached its useful maximum. Its most important bearings are sadly open to the weather and to other factors which adversely affect their fully satisfactory operation; the balancing of its moving parts is only partly possible in practice. It hauls its fuel and water about with it, requires two skilled men to operate it, and it is

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expensive to build, to run, and to maintain in good repair.

Yet in spite of these, and other disadvantages, it has certain points, even in this age of electric power, which make it still the best machine we have for long-distance high-speed haulage. It is, for example, an entirely self-contained generator of power, independent of any external supply, and requiring no elaborate track arrangement such as the electric haulage system necessitates, and it is, moreover, capable of extremely high speed when necessary. The speed of the electric locomotive is not, in general, capable of being pushed beyond a maximum, which, for a given design, depends mainly upon the voltage of the power supply, and upon the gradient of the track. The steam locomotive is truly a knight of the road which it frequents, capable of performing dashing deeds when occasion demands. It is still pre-eminent as an express engine for long-distance work, and it is not likely that it will be entirely replaced, in this country at least, for many years to come. It would be unwise, nevertheless, to say that the tendency of railway development is not in that direction.

It is interesting to consider, for once, the operation of the steam locomotive impartially, setting aside any little prejudices in its favour which we may hold, and glancing rather at those factors which, not infrequently, render the keeping of time on modern running schedules a matter of some difficulty.

Although express engines usually are supplied with good coal, times occur when the quality is not all that it should be. A poor coal, containing a comparatively high percentage of incombustible material, not only produces less heat per pound consumed than a good coal, but also forms large quantities of "clinker" in the firebox. The first of these effects necessitates the burning of a greater weight of coal per mile, in order to maintain the head of steam required for time-keeping, thus throwing a heavy strain upon the fireman, and, due to the necessarily heavy draught on the fire, causing serious loss of boiler-heating surface by furring-over the stay-bolt heads, actually blocking some of the boiler tubes entirely, and, in wet weather, when the coal in the tender becomes sodden, producing "bird's nesting" of the tube ends. The second effect, namely, the formation of clinker, results in the firebars becoming covered with an ever-thickening layer of semi-molten material, which causes increasing difficulty in maintaining the draught necessary for complete combustion. Bad coal will, on the best engine, make time-keeping an anxious and often a difficult task, but, if the engine is normally a poor "steamer," it will certainly cause time to be lost upon the journey, and may even bring about a total failure of the locomotive. A word or so concerning "clinker" may help the reader to understand the fireman's difficulties more clearly. It is formed by the fusing of the earthy matter present in some degree in all but the best steam coals, and may be either hard or porous. The former variety is the more troublesome, lying in the form of viscous treacle upon the fire-bars under the fierce heat of the fire when running, and setting into slabs, almost as hard as metal, when cold. When it is stated that this occurs over practically the whole grate area, and that, in bad cases, as much as half the firebox coal space may be filled by it, an idea may be gained of how serious its presence can be. Porous clinker is slightly less troublesome, allowing the passage of some draught, but is very undesirable, nevertheless.

The removal of clinker from the firebox of an express locomotive while running is impossible. It is almost impossible during a station stop, unless the latter be of unusually long duration, for the heat is intense and the glare blinding, while the clinker itself is in a semi-liquid state. In such circumstances it is almost impossible to separate it from the half-ton or so of white-hot coal in the firebox.

The fireman's task upon an express locomotive footplate calls for a large degree of physical endurance, and no small degree of skill. If the requisite standard of skill is not possessed (and such cases occur), the chances are that sooner or later time will be lost, and it may also be remembered that the most skilful fireman's efforts may be of no avail sometimes, if the driver is "heavy" in his methods, and wasteful of steam.

Good firing should not only mean skilful

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placing of the coal and skilful handling of the fire and the boiler, but also actual care of the firebox and the boiler in general, combined with a precise knowledge of the driver's methods, the engine's limitations, the characteristics of the road, &c. There are few occupations in which personal care and enthusiasm can improve efficiency so much, nor carelessness and incompetency cause more difficulty in getting successfully through the day's work. A neglected engine will soon become a poor steamer, and a badly-fired engine will need boiler repairs earlier than one whose fireman is master of his work. The eight-hour day has been, in fortunately, has ceased in many cases to apply, and engines are less efficient as a result.

Before leaving the subject, it would be interesting to steal a glance at the fireman and his work under actual running conditions upon the footplate. As an example may be taken the case of a fast train approaching London, non-stop from Sheffield, or even Leeds. Perhaps the most interesting period of this run will occur after leaving Wellingborough behind. The heavy gradient of Sharnbrook bank lies ahead, and, in preparation, the fireman will have worked his fire fairly thick, and will have the boiler as full as possible.

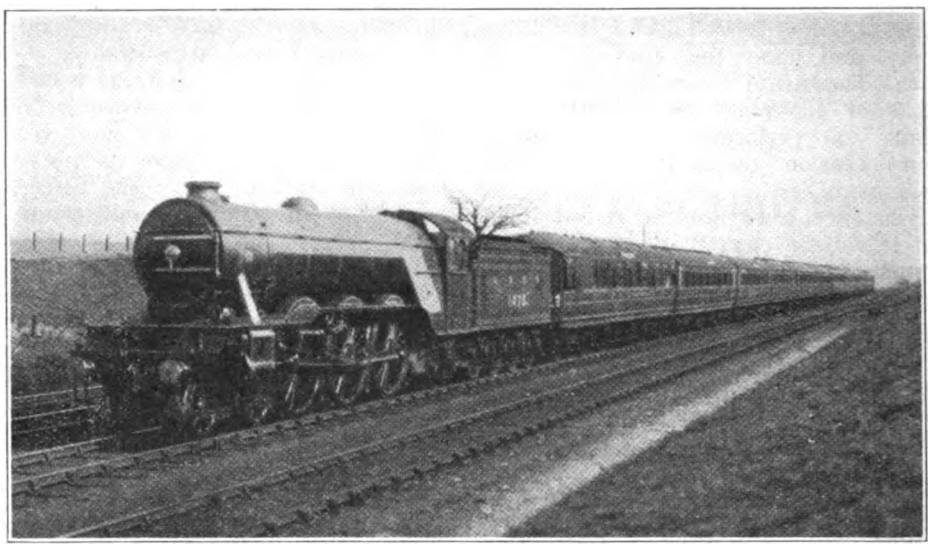

Photo.] [*H. Gordon Tidey.*

L.N.E.R. 4-6-2 THREE-CYLINDER LOCOMOTIVE ON EAST COAST EXPRESS.

one way, a factor militating against the most efficient express locomotive operation, in that it has resulted in a locomotive's changing hands, and often having no one pair of men who can regard it as their own. In days gone by, an express driver would frequently work none but his own engine, from the time she left the shops after her periodical overhaul, until she was due for overhaul again. In such circumstances both driver and fireman became so accustomed to their engine's peculiarities, and often had such a personal pride in her, that their ability to accomplish a difficult task when it occurred was considerably enhanced. This, un-

Then, if all is not well with the boiler pressure towards the end of the climb, he will be able to shut off his injector for a minute or so until the boiler "pulls itself round." Probably he will not fire at all while ascending the bank. On reaching the summit, on will go the injector again, feeding the boiler with fresh water, the fire door will be opened and the "pricker," or long fire-iron, inserted for a few moments, to shake up the fire. Then, stooping forward and bracing himself against the increasing sway and vibration as the speed climbs towards the 75 or 80 miles per hour mark, the fireman will rapidly place a fresh charge of coal in

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each of several positions inside the firebox—a raging white-hot inferno of flame, which blinds the eye to all detail within. As, by this stage of the journey, the fire will be dirty, due to clinker, the damper will probably be opened wider to aid the draught, the fire door having been closed beforehand.

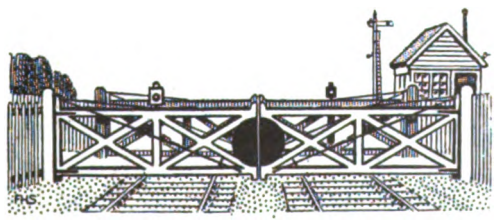
All this will be occurring during the downhill rush to Bedford, in preparation for the notorious Leagrave bank, some 18 miles in length, which lies ahead. It may be stated in passing that time is frequently lost up this bank, especially by long distance trains, often to be made up again by fast running over the last 30 miles into London, and that it is more common to be somewhat short of steam at the summit than otherwise.

Whilst the foregoing may not at once appear to be a strict description of locomotives' limitations, it may help to reveal the personal factors upon which their successful operation so much depends. It must be conceded that the simple operation of the electric locomotive gives it a definite advantage in that respect, enabling all conditions of load to fall upon the sub-station supplying the section of track in which the train may be, and placing the problems of operation on other shoulders than those of the train crew. Its dependence upon the skill and endurance of its crew is really a limitation upon the steam locomotive's performance.

But these natural obstacles to consistent time-keeping on fast running schedules may, even on modern express engines, be increased by further troubles, at times. Thus, leaking boiler tubes, foundation rings, firebox patches and seams, or firebox stays, may cause deadening of the fire, waste of heat, even difficulty in maintaining the boiler water level. Fast running, or heavy loading particularly in hot weather, may cause overheated axle boxes, a type of failure to which the locomotive is peculiarly susceptible, on account of the heavy loads which the axles have to carry, in order to give the driving wheels sufficient adhesion to transmit their power. A badly-fitting smokebox door may allow air leakage to occur, and so impair the draught upon the fire, by lessening the smokebox vacuum. The maintenance of steam pressure when faced with heavy going is then very difficult. A similar loss of effective draught will occur if the blast pipe alignment is not correct, or if leaking superheater-header joints blow steam down the front tube plate.

From any of these causes a poor steaming engine will result, and even if none occurs upon a particular locomotive, the passage of time towards the date when she is due for overhaul will generally see a decrease in her steaming abilities, though she is still required to keep time with her train. The possible sources of trouble upon the express locomotive have not yet been fully described, but sufficient will have been said to show that we do not always appreciate what may be involved in hauling heavy trains long distances, at present-day average speeds.

When all things are considered, the British railways and their locomotive performances are well worthy of admiration and respect, and, whilst such troubles as have been described are perhaps as much the exception as the rule, yet the standard of punctuality and safety generally maintained must be held to reflect personal credit upon the men concerned, as much as to form the subject of esteem for the locomotive alone.



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SCENES ON THE HUNDRED OF MANHOOD & SELSEY LIGHT RAILWAY.

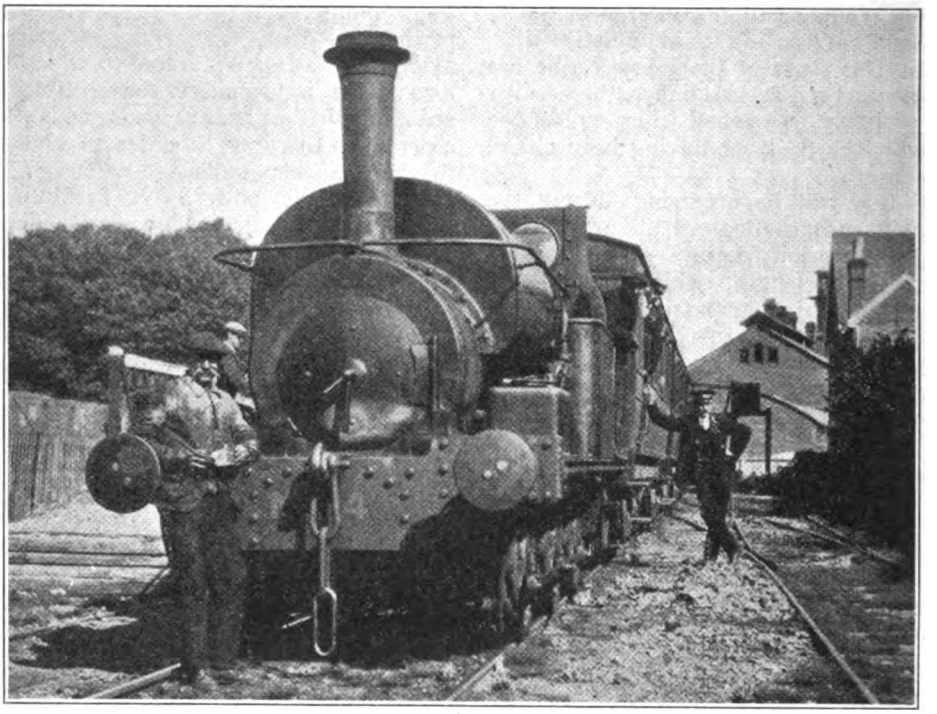

Photo.] CHICHESTFR & SELSEY TRAIN. [*M. White.*

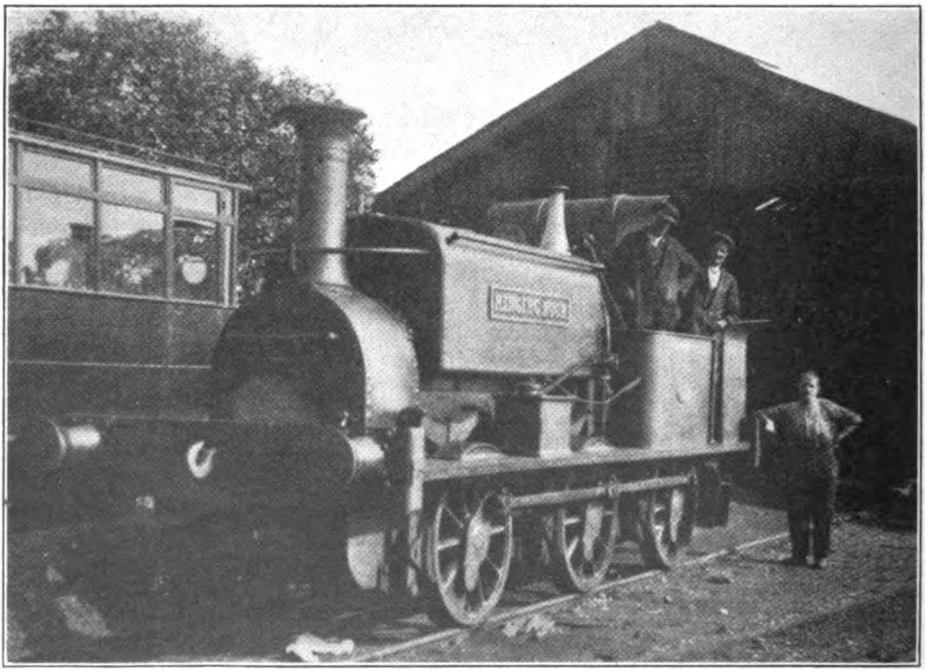

Photo.] NEW 0-6-0 TANK ENGINE NO. 5 "RINGING ROCK" AT SELSEY. [*G. L. Moore.*
Built by Manning Wardle & Co. Ltd.

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Photo.] [*K. A. C. R. Nunn.*

TOWYN-ABERGWYNOLWYN TRAIN NEAR RHYDYRONEN.

Engine "Tal-y-llyn."

The Tal-y-llyn Railway.

By H. G. W. HOUSEHOLD and O. ELSDON.

THE Tal-y-llyn Railway, incorporated in 1865 and opened in the same year, at a cost of £2,143 per mile, runs eastwards from Towyn (Merioneth), up a valley to the station of Abergwynolwyn, a distance of 6 miles 51 chains. From this point passenger traffic ceases, but the line continues as a mineral tramway, for about another mile and a half to the slate quarries of Bryn Eglwys.

It was opened in 1865 for the purpose of carrying slate from Bryn Eglwys Quarries which employ 160 men. Besides the slate traffic there is in the summer months a steady passenger traffic of tourists, for the line forms the most convenient way of reaching Tal-y-llyn Lake from that part of the Cambrian coast. It is a pleasant walk from Abergwynolwyn up the Dysynni Valley to the lake, and for the benefit of the less energetic there is a motor charabanc which does the journey in connection with the trains. There are also excellent walks to be found from the other stations on the line.

The construction of the railway, which is of 2-ft. 3-in. gauge, involved no serious difficulties. The difference in level between the two termini, only a little over 200 ft., allows of easy grades, while the straightness of the valley and the comparatively easy nature of the country, has not necessitated any engineering works on a par with those of the neighbouring Festiniog Railway.

The permanent-way seems to be more or less heterogeneous, rails of Vignoles-, Bridge-, and Bull-head sections being used, the first and last of about 40 lb. per yard. The line is single and only one engine is allowed to work at once; this dispenses with signals and electric block telegraph apparatus. Speed is limited to 10 m.p.h. The journey takes about 35 mins., including stops.

A shuttle service suffices to work the railway, so there are no passing places, the track being single throughout. Trucks conveying the slate are brought down on the passenger trains. In summer there is a service of three trains each way daily with an extra one each way on Monday mornings and Saturday evenings. In winter there are two trains each way daily. Forty-five minutes are spent on the journey in either direction.

The Tal-y-llyn Railway has two

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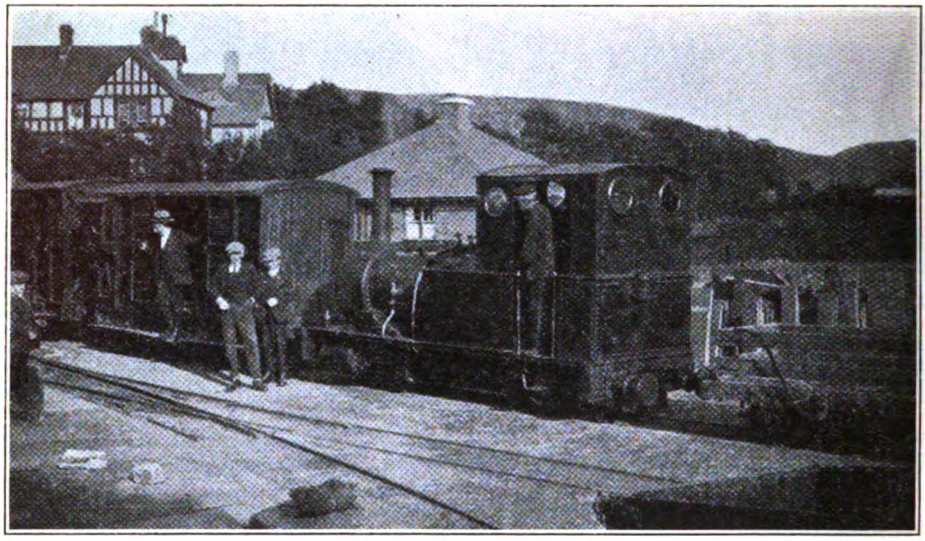
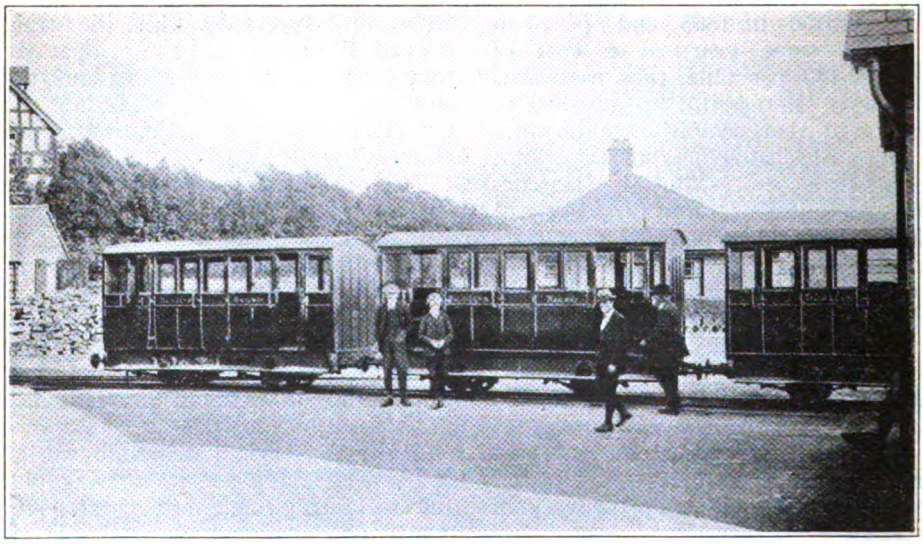


0-4-0 Locomotive and Van.



Passenger Carriages.

SCENES AT WHARF STATION, TOWYN,

(*Photos by O. Elsdon.*)

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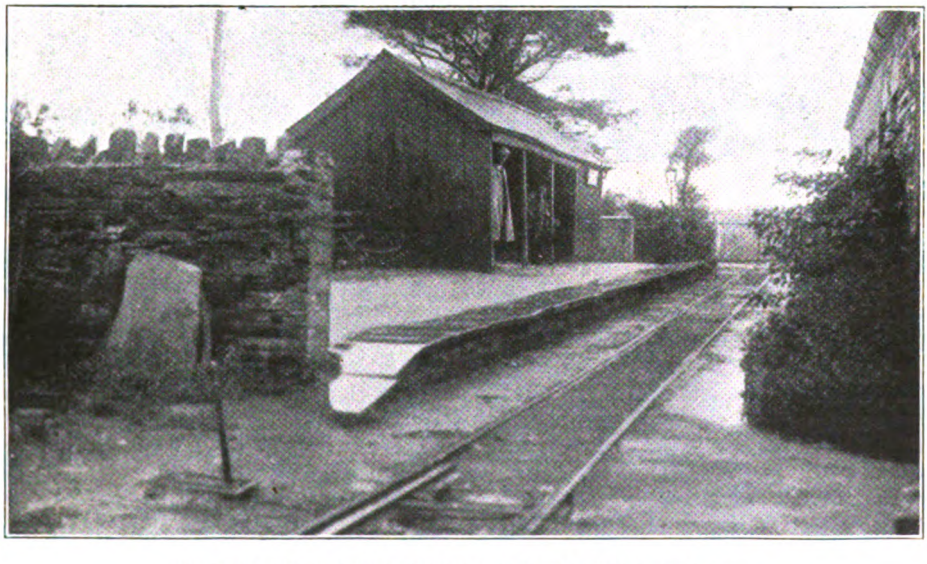
TRAIN AT DOLGOCH STATION, TAL-Y-LLYN RAILWAY.



TOWYN, PENDREF STATION, TAL-Y-LLYN RAILWAY.

(*Photos by H. G. W. Household.*)

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stations in Towyn. One is alongside the Great Western Cambrian Coast Line, where a wharf has been provided for the transhipment of goods; it is not far from the Great Western passenger station and is known, appropriately enough, as "Wharf" station; it has a waiting shed but no platform. Almost all trains arrive at and depart from this station, as Pendref, the main station of the Company, is at the other end of the town of Towyn. Pendref station has a waiting shed, booking office and platform, and here the offices of the Company, the locomotive and carriage sheds, and repair shed are situated. There is a level crossing by this station, but thereafter most roads are carried over the railway by brick bridges.

Leaving Towyn the line runs between thick and high hedges through gently rising country for a distance of two miles to Rhyd-yr-onen. This, in common with the other two intermediate stations at Bryn Glas and Dolgoch, has a platform and waiting shed but no booking office; passengers joining the trains at these stations buy their tickets at a pigeon-hole window in the guard's van. Beyond Rhyd-yr-onen the track climbs more steeply, winding up the side of the beautiful valley of the Afon Fathew. Some delightful views are obtained from the train. Just before reaching Dolgoch station the railway runs through woods and crosses a steel bridge from which there is a pretty glimpse of the Nant Dolgoch deep below, a small tributary stream of the Afon Fathew. After Dolgoch the country becomes rather bleak, and shortly the head of the Afon Fathew valley is reached; the line then joins the Dysynni Valley and climbs on for another mile to Abergwynolwyn station. This, the passenger terminus of the line, has the usual platform, waiting shed and booking office; it is short of and some height above the village, but for goods traffic connection is provided by a rope-worked incline a short distance beyond the station.

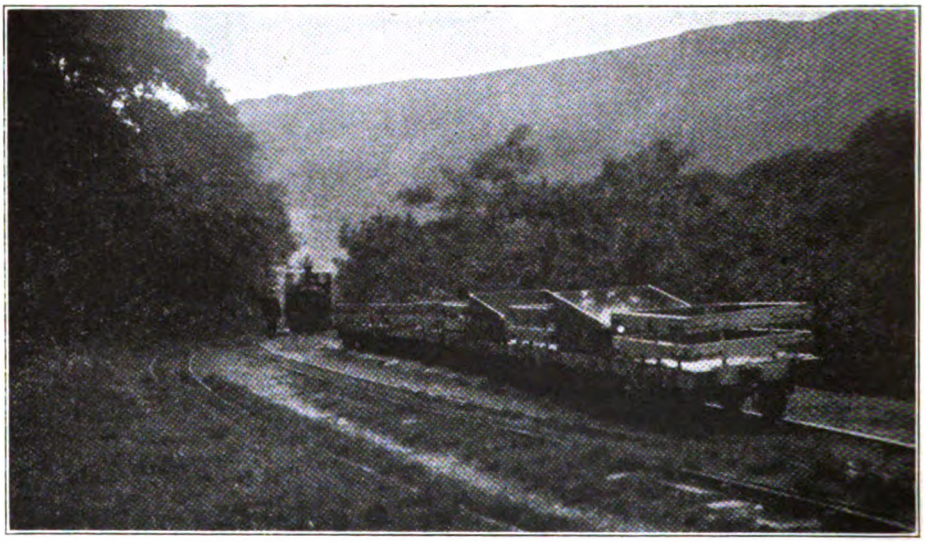

Photo.] [*H. G. W. Household.*

TYPICAL SCENERY NEAR THE INCLINE TO THE QUARRIES, TAL-Y-LLYN RAILWAY.

The line to the slate quarries, very picturesque all the way, continues winding along the side of the valley through the woods to a point, perhaps a mile and a quarter beyond the station, from where a series of gravity-rope-worked inclines lead down from the quarries higher up. Near the bottom of the first incline there is a waterfall in a deep and narrow gorge into which, more than once, runaway trucks from the incline have crashed!

Several streams cross the line to the quarries, and one of them has been partly diverted to furnish a water supply for the locomotive. Some of the water has been

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led off into a wooden trough which ends some seven feet above and four feet to one side of the track; when not in use the water simply falls to the ground and runs away beneath slate slabs under the track; when the locomotive is to be supplied with water it is drawn up alongside the open trough, and a short length of loose wooden trough is laid across from a support below the end of the fixed trough to the filling hole in the tank, and accompanied by much splashing the water runs into the tank—exceedingly simple and effective, with an unlimited supply of water!

The locomotives are two in number, one a 0-4-2 saddle tank locomotive, the other a 0-4-0 locomotive with side tanks.

Passenger coaching stock consists of four four-wheeled coaches and a brake van. These have side buffers and hook-and-chain couplings, as distinct from the centrally placed buffer-couplings used on the other Welsh narrow-gauge railways.

All have recently been smartly painted crimson with yellow lining and lettering. The carriages are of the compartment type, open above the backs of the seats. Third class compartments have plain wooden seats, and the first-class seats have a blue covering. All carriages run on four wheels only, and have spring buffers and screw-couplings, but no automatic brake. Doors are fitted on one side only, as all platforms are arranged on the same side of the track.

The goods vehicles are mainly four-wheeled open-sided slate wagons, with a few ordinary open trucks for coal, &c. A small cattle wagon to carry sheep was also seen by the writer at Pentre station.

Pentre station is the site of the locomotive shed and carriage shed. A small workshop is provided here to carry out repairs to the rolling-stock. The motive power is a small stationary engine supplied with steam by the locomotive not in use on the railway.

ORIENT EXPRESS AT BELGRADE.

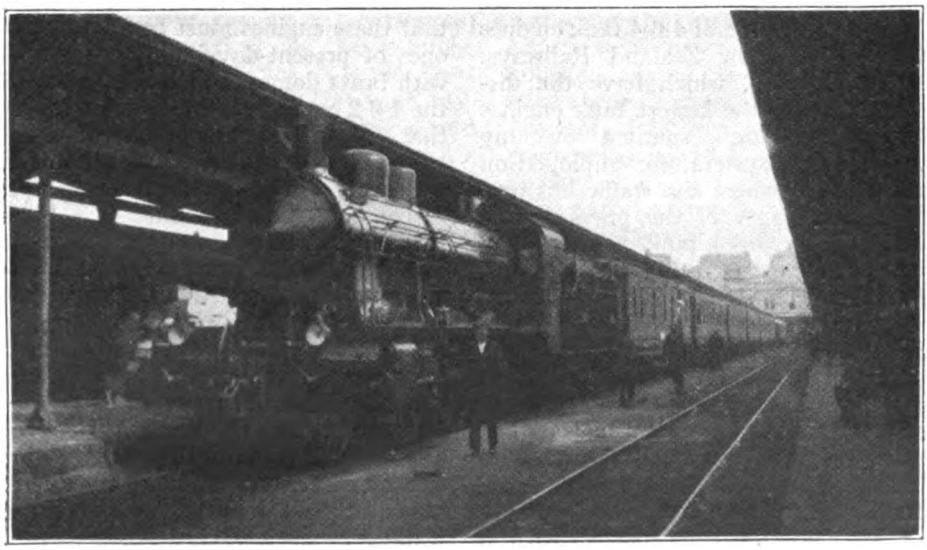

Photo.] *Lord Monkswell.*

Worked by German 2-6-2 Four-Cylinder Locomotive.

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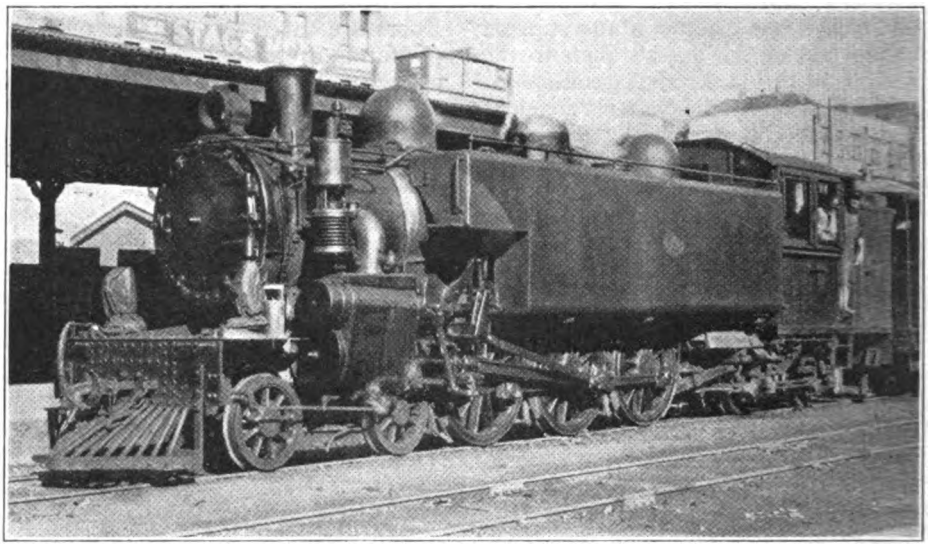
4-6-4 TANK ENGINE, NEW ZEALAND GOVERNMENT RAILWAY.



We are indebted to Mr. C. J. Housego, of Auckland, New Zealand, for the photograph reproduced. This shows No. 768, one of the latest type of 4-6-4 tank engines in use on the New Zealand Railways. These locomotives, which have the distinction of being the largest tank engines of orthodox design running on any 3-ft. 6-in. gauge system, are employed on suburban work where the traffic has outgrown the capacity of the previous and smaller type of 4-6-4 tanks. These new engines, which were built by the New Zealand Government in their South Island workshops, have coupled wheels 4 ft. 6 in., cylinders 17 by 26 in. stroke, and tank capacity of 1,700 gallons. The boiler pressure is 200 lb. per square inch and an M.L.S. superheater is fitted. Weight of the engine in working order is 70 tons.

Mr. Housego also mentions that an order has recently been placed with a private firm of locomotive builders in the North Island for some more engines of this class. Incidentally, it is mentioned that these engines must be about the only ones of present-day build that are fitted with brass domes, and this applies also to the 4-6-2 express locomotives, class "AB," that are still being delivered, nearly 100 having been supplied by the North British Locomotive Company, in addition to those of New Zealand build. Mr. Housego further explains that the six miles of suburban track between Auckland and Penrose Junction are now equipped with three-position automatic electric signals—red, orange and green lights only, no semaphore arms. These new signals are similar to those illustrated in THE RAILWAY MAGAZINE for February, 1925, in an article dealing with the inauguration of electric traction on the Harrow-Rickmansworth section of the Metropolitan Railway.

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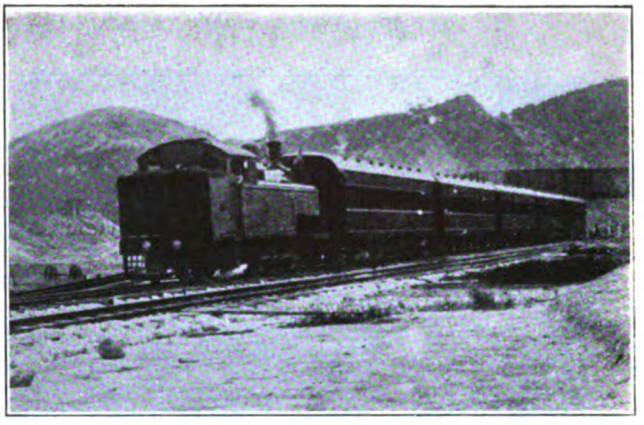
The Kowloon-Canton Railway.



PASSENGER TRAIN ON BRITISH SECTION, KOWLOON-CANTON RAILWAY.

THE British section of the Kowloon-Canton Railway consists of 21½ miles of single track running through most picturesque and beautiful country, some idea of which is given by the views on this and the following pages.

The total distance to Canton is 111 miles, but the Chinese section, operated under normal conditions by the Chinese Government, appears to be in a bad way.

The locomotives employed in regular service on the British section are of two types, both built by Messrs. Kitson, of Leeds. Nos. 1 and 2 are 2-6-4 tanks, inside cylinders, and Nos. 3-8 are 2-6-4 tanks, outside cylinders. There are also two small 6-ft. saddle tanks, Nos. 9 and 10, used for shunting purposes, spares, &c. Four new locomotives, 4-6-4 tanks, are under construction, to augment the motive power and be prepared for developments when through running is resumed. The engines are painted with bright "rice" green panels, borders of dark green, black stripes and yellow lines, and have a very smart appearance.

All trains, both passenger and goods, have the air brake in operation throughout, and the locomotives are all fitted with electric headlights. The passenger cars have electric light and electric heaters, a refinement which appears somewhat unnecessary when the very temperate climate of the locality is considered. The coaches are all of the open saloon type, built to a very generous loading gauge, over 10 ft. wide and 65 ft. long. First, second and third class are provided, but needless to say, the bulk of the traffic is of the latter. To accommodate those carrying market produce, bundles, &c. (nine out of ten Chinamen seem to carry some load or other), one or two wagons are attached to most of the trains; into these "John and Mary Ann" seem to flock like sheep, and they are invariably the best patronised vehicles on the train.

The M.C.B. automatic coupler is standard for all the Chinese railways, and the Kowloon-Canton Railway is accordingly equipped throughout, the passenger stock having a pair of buffers in addition placed at very close centres; these side buffers are considered unnecessary, but are provided so as to be prepared for coupling up with other Chinese stock.

Two steel auto-cars are included among the rolling-stock, made by the Hall Scott Motor Car Company, of San Francisco, U.S.A. These have 6-cylinder engines, for which high-grade kerosene is used, driving a longitudinal shaft operating through a gear-box on the front axle of the rear bogie; this is now the sole driving axle, the second having been disconnected as unnecessary and troublesome. The engine is graded as of 150 h.p. and in addition to operating its own car, third class, can haul an additional first and second and also a wagon for the market men, as already mentioned. One of these auto-cars forms the first train into Kowloon in the morning and the last out at night.

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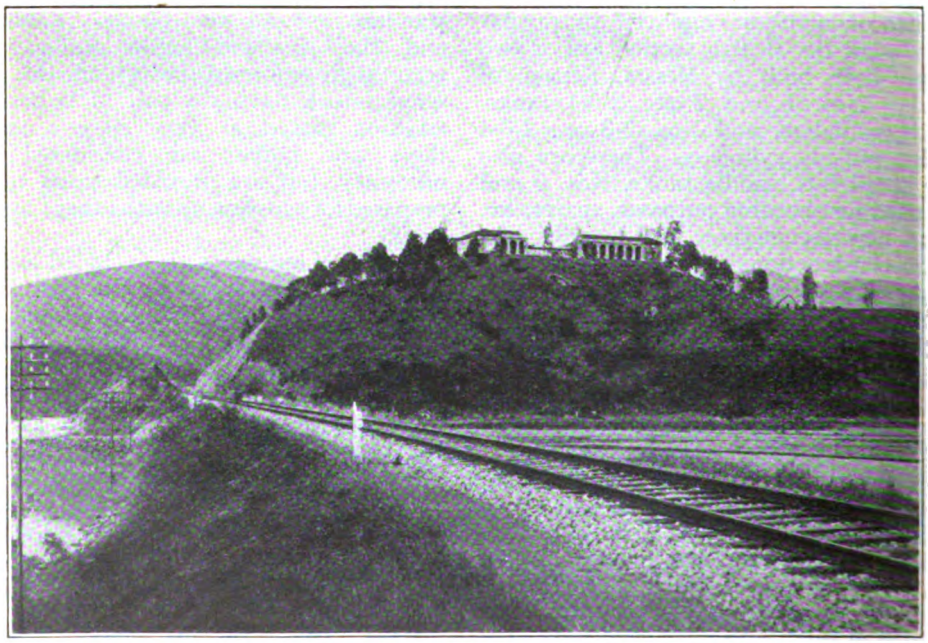
HONG KONG FERRY STATION.



VIEW NEAR TAI PO, SHOWING THE MAGISTRACY AND LAND OFFICE.

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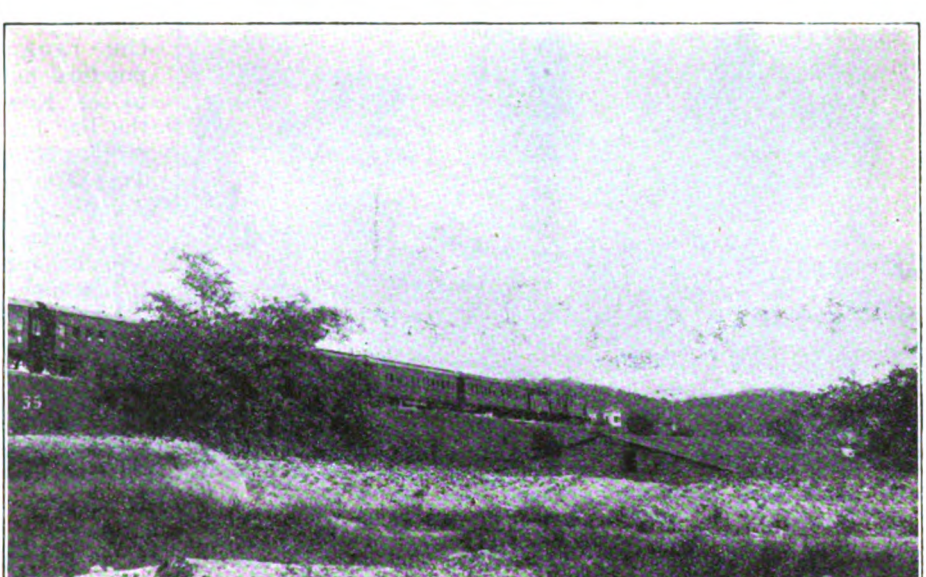
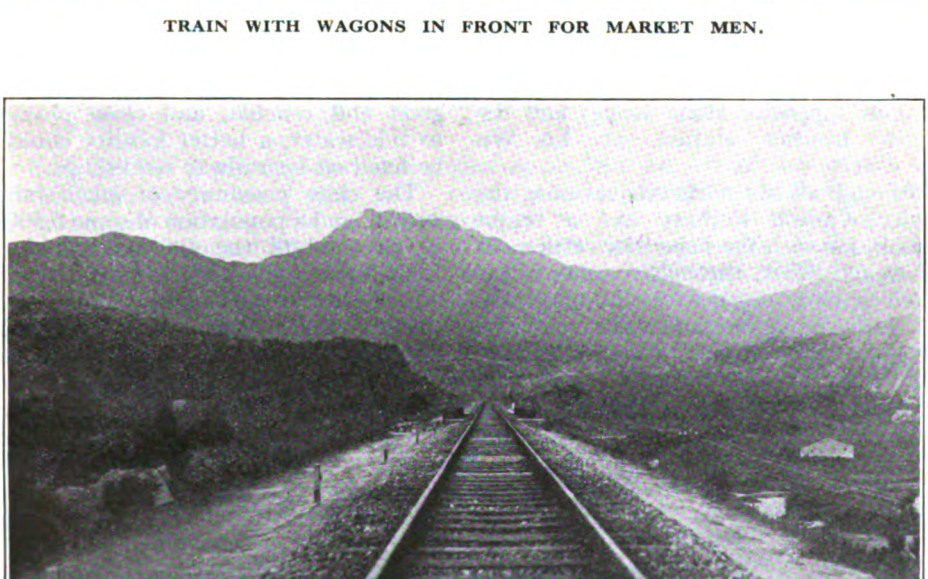


TRAIN WITH WAGONS IN FRONT FOR MARKET MEN.



VIEW NEAR HONG HUN STATION.

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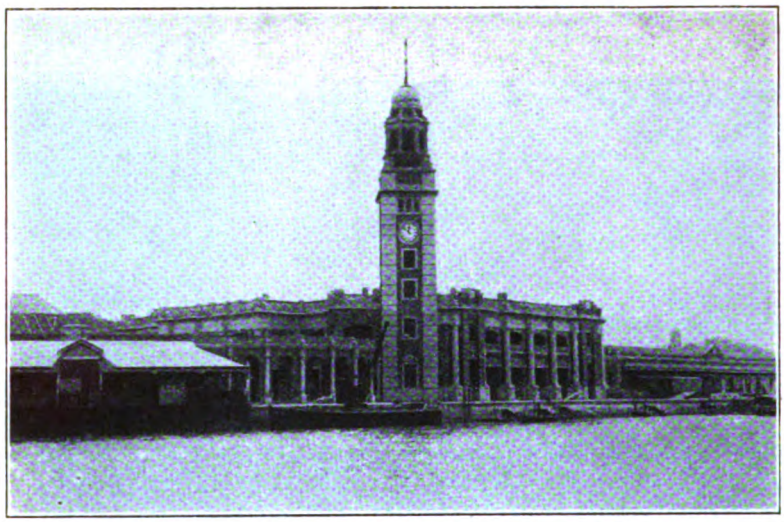


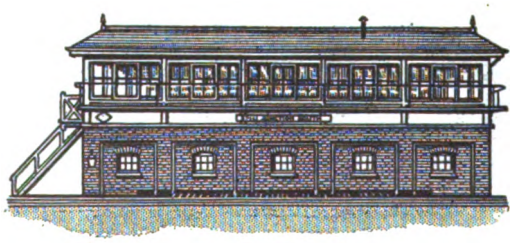
KOWLOON TERMINAL STATION AND TRAIN SHED.

Pekin (already promised by Dr. Sen), it is within the range of practical politics to see Kowloon the Far Eastern terminus of a Trans-European-Asiatic express. The Government already appears to acknowledge the future importance of this railway, hence the generous arrangements made for doubling the large area of land reserved for terminal station arrangements, connections to the docks, quays, &c., and the provision for extending the workshops. These latter are at present situate about a mile from the Kowloon terminus and are well equipped for repair work and construction of wagon bodies. With a plentiful supply of Chinese labour, proverbially good and reliable, and close proximity to tide water, a better locality could not be fixed on for railway workshops.

Owing to the troubled state of affairs existing in South China the express service between Kowloon and Canton ceased on April 16, 1923. From this time trains ran spasmodically until October 27 of the same year, when all through traffic was discontinued. Since then a regular service has been maintained between the Kowloon terminus (opposite Hong Kong) and the British frontier station at Lo Wu only.

Although all but dormant just now, the Kowloon-Canton Railway has a bright outlook, for with the hoped-for settlement to law and order, through running is expected to be resumed with through working; hitherto engines and train crew were changed at the frontier. Further, as only a few miles of railway are now required to secure through rail connection with

The close proximity of much mineral wealth, and a population of some 2,500,000 at one end of the 100 miles and over 1,000,000 at the other, render the condition of this railway somewhat unique, and should make any traffic manager's "mouth water," for sooner or later transportation must develop far beyond the ordinary dreams of prosperity.



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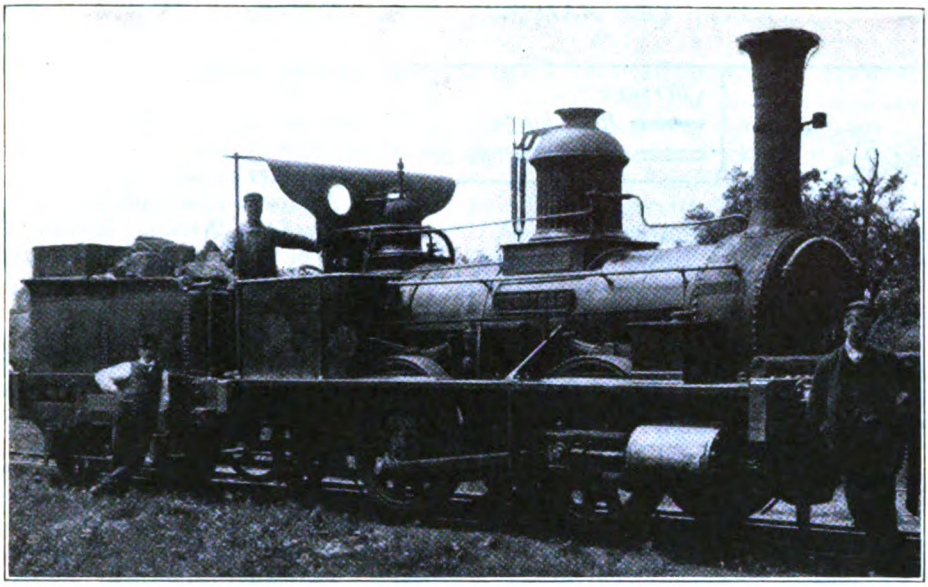

Photo.] **OLD 0-4-0 TENDER LOCOMOTIVE "COUNTESS."** [*G. M. Perkins.*
Built in 1859 by Manning Wardle & Co. for the Earl of Dudley's Railway. Now scrapped.

The Wolverhampton and Kingswinford Railway.

By T. R. PERKINS.

NEARLY 100 years ago—on June 2, 1829, to be exact—the first passenger train to run in the Midlands clattered through the little village of Wall Heath in South Staffordshire, on its way from the Shutt End colliery to the Staffordshire and Worcestershire Canal at Ashwood Basin. Provided exclusively for the transport of coal, the railway, which has been regularly worked ever since, does not appear to have catered for passenger traffic on any occasion subsequent to its opening day; and until last year the district was quite isolated from railways of the ordinary passenger-carrying type. This comparative isolation, somewhat remarkable when its nearness to the densely-populated "Black Country" is remembered, has now been remedied by the opening of the new branch line of the Great Western Railway between Oxley and Kingswinford Junctions, which not only provides a new route for goods traffic independent of the crowded line through Dudley and Wolverhampton, but also opens out an attractive stretch of country for residential and holiday purposes.

The new line, although it does not actually cross the route of the original Shutt End Railway, nevertheless passes very close to its eastern terminus, and parallels its course for some distance near Wall Heath. In later years the old line was extended and a portion at the eastern end abandoned, owing to the closing of one colliery and the opening of others: it is now known as the Earl of Dudley's Pensnett Railway, and extends from Ashwood Basin to Cradley Heath on the Birmingham and Stourbridge branch of the G.W.R., crossing the same company's Oxford, Worcester and Wolverhampton section on the level at Round Oak. This extension of the Pensnett Railway, which makes an almost semicircular detour north of Shutt End, in order to serve the collieries, is crossed near Pensnett by the new line, with which, by a connecting curve, it makes a junction; the oldest

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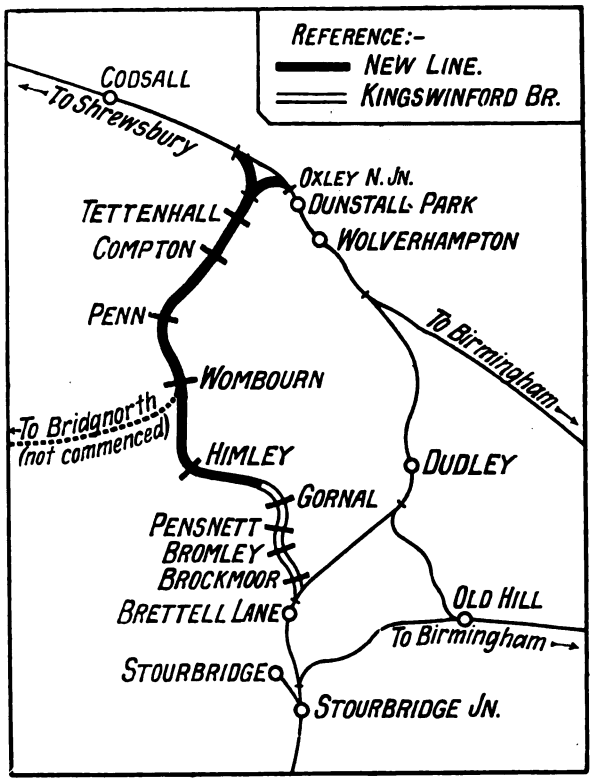

SKETCH MAP OF NEW LINE AND CONNECTIONS.

and the newest are thus brought into actual —if a little indirect—connection.

Many of our readers are, doubtless, familiar with the appearance of the locomotive *Agenoria*, which drew the train on that memorable day in 1829, as it now rests from its labours in the South Kensington Museum. With its gigantic funnel—14 ft. 4 in. long—and its awkward-looking beam motion, it must have appeared a weird and wonderful object to those who then saw it for the first time; while its hauling power would seem to them almost miraculous, as it is reported to have drawn on that occasion a load of 130 tons. True, the speed was only 3½ m.p.h.—walking pace—and the gradient a falling one of 1 in 330; but it must be remembered that the only standard of comparison in those days was that of the power of horses, compared with which the locomotive was a veritable Goliath. This grand old pioneer of railway traction was a local product, having been built in the neighbouring town of Stourbridge, and so good was the workmanship and material put into it that it continued to work without much alteration until the "'seventies." The illustration on page 443 shows the veteran in steam during the latter part of its active career.

Although nearly all the locomotives of the Pensnett Railway are now of fairly modern type, it was possible within the last few years to see some quaint survivals of former locomotive practice at work upon that section of the line where *Agenoria* once held sway. A numerous class was that represented by our illustration of *Countess*, a type fairly common in the "'fifties" of last century; the railway rebuilt most of these in later years as saddle-tanks, thus modernising them in appearance as well as in power, but a few years ago—when, alas! I saw the dome and other remains of *Countess* lying on the scrap-heap —one at least of them, the *Frederick*, still survived in more or less of its original condition, though I noticed it had been rebuilt with a Belpaire firebox, presenting a decidedly curious appearance. Another locomotive, a six-coupled side-tank named *Queen*, also dated from the "'sixties," and possessed a special interest for me from the fact that it was identical with two of the locomotives of the unfortunate "Potteries" Railway.

Turning from this veteran among railways to its exceedingly modern neighbour, it may be noted that the latter is by no means a thing of mushroom growth. Many years ago a railway was projected through the area; and the original Act obtained by the Great Western Railway was passed as long ago as 1905. This latter authorised a railway connecting Wolverhampton with Bridgnorth on the Severn Valley line, with a branch from near Trysull to join the Kingswinford mineral line near Shutt End; but the powers were allowed to lapse. In 1913 a revised scheme was sanctioned, under which the construction of the Bridgnorth section west of the Trysull junction was postponed, and the course of the remaining portion altered, so as to bring the line nearer the large village of Wombourn. Considerable progress was made with the

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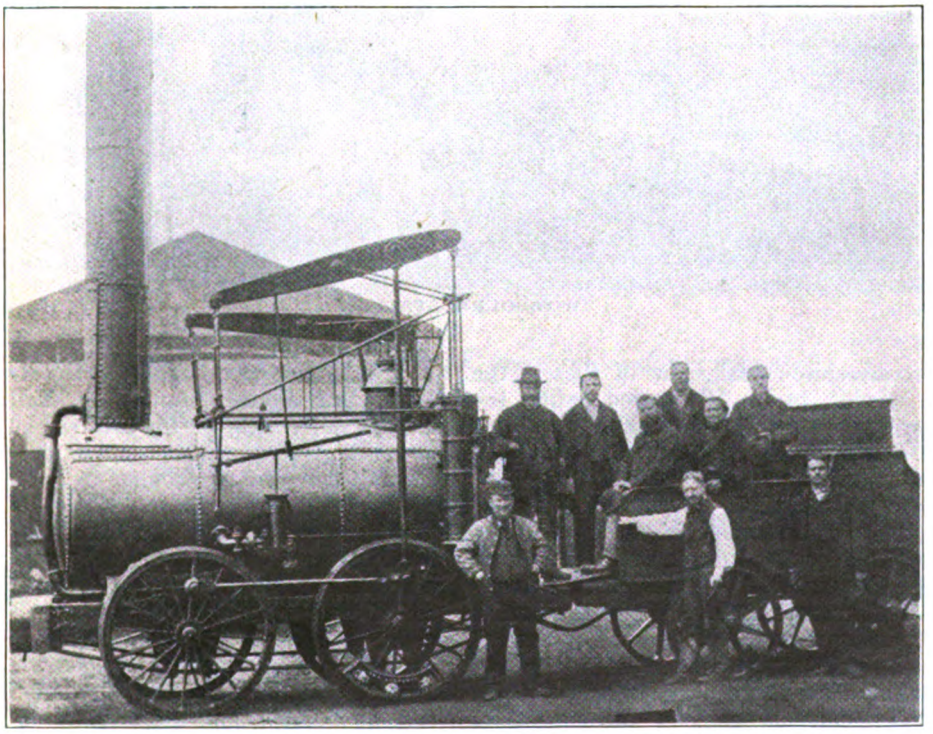
works before the exigencies of war-time compelled their suspension, and for a number of years the rail-less track has been standing unfinished. With more favourable conditions in sight, work was recommenced, and, as previously stated, the line was opened for passenger traffic on May 11, 1925.

Coal is, of course, the *raison d'être* of the new line, although at present the country passed through would never lead one to think so. Several collieries have been opened on the Earl of Dudley's estate at Baggeridge, near Himley, and it is probable that coal may be found along the route of the already-authorised Bridgnorth section. At the southern end the trains make use of a mineral branch which has been in existence for a number of years, by which coal traffic reached the O.W. and W. section at Brettell Lane; but the new line will give a direct connection to the north over a route free from the difficulties imposed upon the older line by heavy gradients and crowded traffic.

At the time of the authorising of the original (Wolverhampton to Bridgnorth) line, the G.W.R. put on a service of motor omnibuses between the two towns, but have now ceased to work this traffic, which is at present handled by the Wolverhampton Corporation.

As will be seen from the map, the new line, which is rather more than 12 miles in length, leaves the Worcester-Wolverhampton section at Kingswinford Junction, a few chains north of Brettell Lane station, and runs to a double junction with the Shrewsbury and Wolverhampton section at Oxley North and Codsall loop junctions between Dunstall Park and Codsall. For the first 2¾ miles the old Kingswinford mineral branch, doubled and relaid, is traversed; but the remaining portion to Oxley West Junction, which is single except for a stretch of double line through Wombourn station, is of new construction. Stations, each with two platforms and commodious buildings of red brick, have been provided at Himley, Wombourn and Tettenhall, with halts at Brockmoor, Bromley, Pensnett, Gornal, Penn and



"AGENORIA" (SHUTT END RAILWAY) AT WORK ABOUT 1870.
Built by Foster, Rastrick & Co., Stourbridge, 1829. (Photographed from an old print.)

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Compton. Passenger traffic, which is at present rather light, is worked by rail-motors, a service of three cars each way being given between Wolverhampton and Stourbridge Junction, with four additional trips in each direction between Wolverhampton and Wombourn.

The two loops from Oxley West Junction into the main line are double track, while on that section now single the cuttings, bridges, stations, &c., have been constructed to accommodate an additional line when the amount of traffic shall necessitate its provision. There are 21 underbridges and 15 overbridges, two of the former spanning the Staffordshire and Worcestershire Canal; one of these is the fine girder bridge illustrated, while the other—near the junction with the main line at Oxley—has three brick arches each of 48 ft. span.

The "novel point of view" has a great fascination for many people, and to see familiar objects and places from a new angle is certainly interesting. To one who has traversed the whole of the British railway system, such opportunities of seeing well-known places from the *unfamiliar* view-point of the window of the railway carriage can, in the nature of things, come but seldom, and it was therefore with the keenest anticipation that I arranged to travel over the new line a few days after its opening. More than 30 years ago, when resident in Wolverhampton, I was familiar with practically the whole of the district served by the new railway, and as I had had no opportunity of inspecting its course during construction, and had only seen it in its unfinished condition at one or two points, curiosity added zest to my already keen interest. It was decidedly odd to see on station name-boards the names of places well known in former days, and to look out for once-familiar landmarks from a new angle.

Supposing that we have arrived at Stourbridge Junction, a busy modern station whence lines diverge to Worcester and London, Birmingham, Stourbridge Town, and Wolverhampton, we shall find on the outer side of the western of the two island platforms a couple of those vehicles now almost peculiar to the Great Western Railway—rail-motor-cars. One of these runs backwards and forwards to the Town station; in the other we take our seats. Leaving the station, we note the Birmingham line diverging to the right, and cross the valley of the Stour by a high viaduct, with a good view of Stourbridge on our left. Brettell Lane is soon reached, and a few yards beyond we leave the Wolverhampton line, calling at Brockmoor halt some 30 chains further on. High above us on the right is Brierley

Photo.] WOMBOURN STATION. [*H. L. Warner.*

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Hill, with its church prominent on the ridge; all around are canals, ironworks and collieries. Passing successively Bromley, Pensnett and Gornal halts, all within 2½ miles of the junction, we begin to find the country opening out, with pleasant views in the left distance. At Baggeridge Junction, where the line to the collieries goes off to the right, we enter upon the new line, which is henceforth single; the scenery hereabouts is wooded and very pretty. In the valley below runs the Pensnett Railway, and a coal train passes along it, drawn, not alas! by *Queen* or *Frederick*, but by a fine modern "Peckett" saddletank. We are now close to the scene of *Agenoria's* exploits in days gone by, and soon cross the Pensnett line and approach open country at Himley. Across the fields to the left the houses of Wall Heath are visible; on the right is Himley, where the Earl of Dudley has a residence. Here we are also on historic ground, as Holbeach House, where the Gunpowder Plot conspirators made their last stand and were captured, is only a short distance from the line; while onward to Tettenhall we travel by almost the same route as that taken by Charles II in his flight from the Battle of Worcester to his hiding-place at Boscobel. Crossing the main Wolverhampton-Worcester road, we approach Himley station by a long embankment: rather more than a mile away can be seen a tall chimney marking Ashwood Basin, the terminal point of the old Shutt End Railway. Himley station stands on the edge of a pretty wood: here the railway company has made a new road to the village of Swindon, nearly a mile in length. Double platforms exist here and at Tettenhall, but at present only a single line is laid through. Plunging into the wood, we enter a cutting through sandstone rock, emerging from which we get a good view of the village of Wombourn on the right, with the tall chimneys of the Black Country showing on the horizon. Another cutting, and Wombourn station is reached, nearly 2 miles from Himley and 6½ from Brettell Lane. Here a double line is laid through the station, and a large water tank stands high above the platform, with water columns at each end of the station, which is prettily situated on an embankment, with the wooded Orton Hill to the right and a picturesque valley on the left. The signal posts, it may be noted, are of reinforced concrete. Proceeding amid delightful scenery, with the Staffordshire and Worcestershire Canal not far away on the left, Penn halt is approached by a short cutting; the single platform here is of wood, and a small

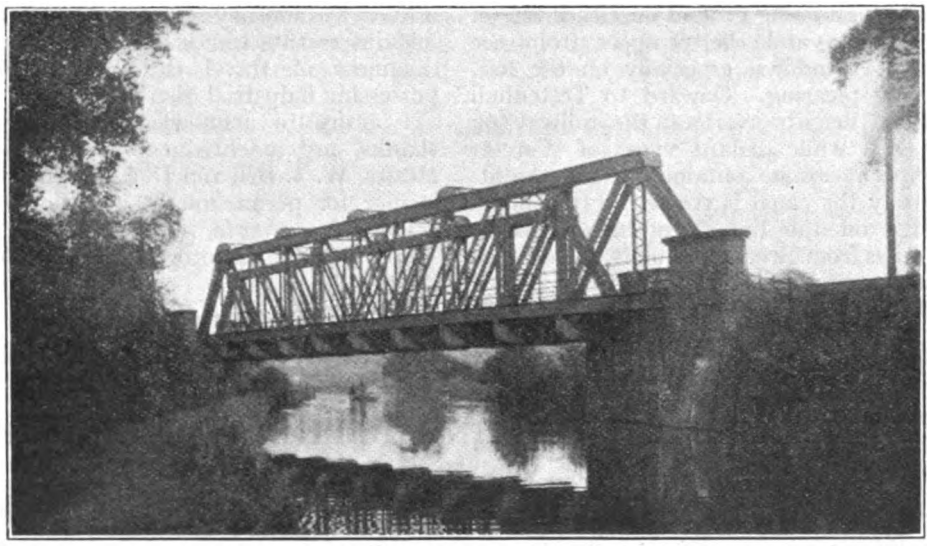

Photo.] [*H. L. Warner.*

BRIDGE OVER CANAL BETWEEN COMPTON AND TETTENHALL.

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waiting-room of corrugated iron is provided. The hamlet of Lower Penn is not far away, but Upper Penn, a large village on the main road, is too far from the railway to be much served by it, especially as a good service of motor-omnibuses runs between the village and both Wolverhampton and Stourbridge. The succeeding 1½ miles to Compton is practically all in cutting, from which the train emerges on to an embankment close to the halt, which is similar to that at Penn. Here we are only two miles distant by road from Wolverhampton, though by rail—owing to the circuitous course taken by the line—the distance is 4¼ miles. This pleasant suburb occupies a charming position on rising ground on either side of the valley, and the prospect from the carriage windows, especially on the left, is very pleasing. Onward to Tettenhall wooded heights overlook the railway on the left, while distant views of Wolverhampton can be obtained on the right. Midway the canal is crossed by the finest bridge on the line. Tettenhall, nearly 11 miles from Brettell Lane, is exceedingly picturesque: it is practically part of Wolverhampton, and shares the municipal tramway service. Here is provided fairly extensive goods accommodation. With a view of the old church on the left we commence to climb to the junction with the main line at Oxley, 1½ miles further on, with a fine view of the town of Wolverhampton on the right; reaching the junction we make a brief halt at Dunstall Park, and note the locomotive works at Stafford Road ere drawing up in the Low Level station at Wolverhampton.

As the fare from Brettell Lane—and presumably from places beyond—to Wolverhampton is the same by way of the new line as via Dudley, an opportunity is afforded to passengers (who are not in a hurry) to journey by a most picturesque and interesting route, while avoiding the dinginess of travel through an unprepossessing industrial district.

I desire to acknowledge, with many thanks, my indebtedness to my friends Messrs. W. J. Bell and H. L. Warner; the former for permission to use the photograph of *Agenoria*, and the latter for supplying the photographs illustrating the new line.

GENEVA EXPRESS LEAVING BERNE, SWITZERLAND.

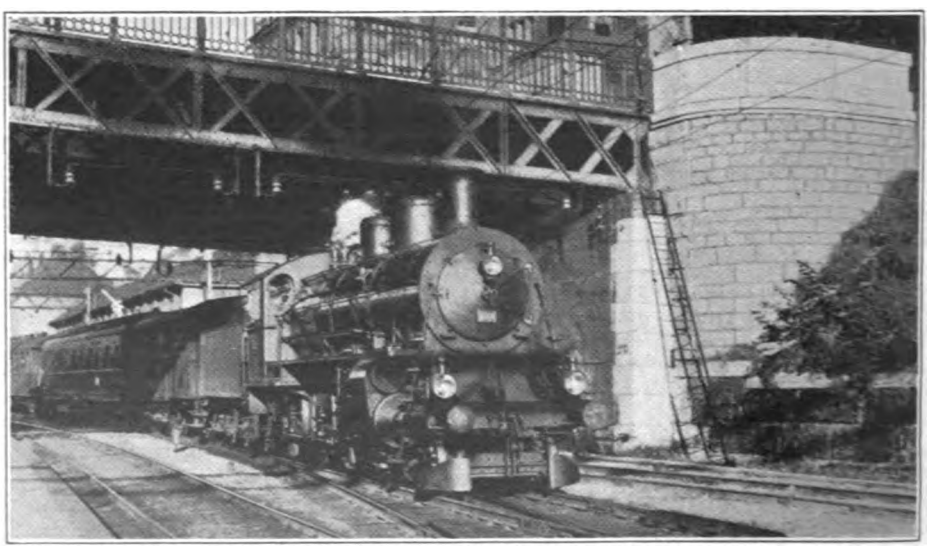

Photo.] [*F. Martin Vaughan.*

4-6-0 LOCOMOTIVE, No. 633.

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Irish Passenger Train Services.

A COMPARISON: 1903 AND 1925.

By MAJOR J. A. DANE, D.S.O.

HAVING recently unearthed the time-tables of the Irish railways for 1903 it occurred to the writer that a comparison between the facilities given then and those offered at the present time might be of interest, at any rate to Irish readers.

The winter services have been selected for purposes of comparison because during the last two summers none of the usual tourist expresses were run, and it was felt that a comparison between the summer services would have been misleading.

Table A shows the services between Dublin and the principal provincial towns. Not only are the best times compared, but also the average times which are really the most important. In working out the latter certain trains have been omitted, such as the night mails on the G.S. and W., M.G.W., and G.N. Railways; the 10.30 a.m. (1903) Amiens Street to Belfast, 11.30 a.m. (1925) Amiens Street to Londonderry, 12.30 p.m. (1925) Kingsbridge to Cork, and 9.30 a.m. (1903) in the reverse direction. There are (or were) slow trains stopping at all stations, or else trains with long waits for connections *en route*, in either case not likely to be used by the average through passenger.

The last few years have been very difficult ones for all the Irish companies, and it is very satisfactory to note that although the best times have suffered in some cases, and one train in each direction has been discontinued on most of the Southern lines, yet in all cases the average times have been improved upon. The reduction in average times on the G.N.R. is very marked, particularly on the main line. Owing to the Free State customs examination at Dundalk all the up trains have been given an increased time allowance at that station, averaging six minutes. In order to make the comparison with the 1903 times a fair one this increase has been deducted from the overall times from Belfast and Londonderry to Dublin.

TABLE A.—COMPARISON OF BEST AND AVERAGE TIMES BETWEEN DUBLIN AND PROVINCIAL TOWNS.

			Best Times.			Average Times.					
						1903.		1925.			
Railway or Section.	Town.	Miles.	1903.	1925.	Increase or Decrease	No.	Time.	No.	Time.	Decrease.	
			h. m.	h. m.	m.		h. m.		h. m.	m.	%
G.N. ..	Belfast	112½	2 35	2 25	− 10	9	3 15	10	2 41	34	17·4
	Londonderry ..	162¾	4 20	4 15	− 5	6	5 15	6	4 38	37	11·7
G.S.&W.	Cork	165½	3 55	3 40	− 15	8	4 56	6	4 31	25	8·4
	Limerick ..	123¾	3 15	3 5	− 10	8	3 52	6	3 35	17	7·3
	Waterford ..	110½	3 20	3 15	− 5	8	4 04	7	3 47	17	6·9
M.G.W.	Galway	126½	3 32	3 40	+ 8	6	4 16	6	3 56	20	7·8
	Sligo	134¼	3 52	4 10	+ 18	6	4 39	6	4 25	14	5·0
D. & S.E	Wexford ..	92¾	3 0	3 15	+ 15	8	3 39	6	3 35	4	1·8

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Little variation is shown in Table B—Longest Daily Non-Stop Runs. It must be remembered that there are no great centres of population in Ireland outside Dublin and Belfast, and that, apart from the Summer Tourist Expresses, which used to be run on the G.S. and W., and M.G.W. Railways, long-distance non-stop expresses as understood in England are unknown. Track troughs do not exist. The longest regular run in Ireland is the Kingsbridge–Thurles run on the G.S. and W. Section of the Great Southern Railways. This re-appeared last summer, when the morning train from the South was booked to run the 86¾ miles in 105 minutes, giving an average speed of 49·5 m.p.h. Thurles is not an important traffic point like Limerick Junction, and one looks forward to the time when the new 4–6–0's will be booked to run non-stop for the 107¼ miles between Kingsbridge and the latter station. This would give Ireland a place in the table of 100-mile non-stop runs, published annually in THE RAILWAY MAGAZINE, and might also contribute towards the restoration of the even four-hour service between Dublin and Killarney, now defunct since the closing years of the 19th century.

It will be seen from Table C, that, whereas in the winter of 1903 there were no runs booked at 50 m.p.h. or over, this winter both the G.N.R. and the G.S. and W. section exceed this figure.

Lest it be thought that the G.N. run included in the table is an isolated instance over a very short distance, the following additional runs on this system at the rate of 50 m.p.h. or over, are also given :—

TABLE B.—LONGEST DAILY NON-STOP RUNS.

Railway or Section.	Year.	Run.	Miles.	No.	Fastest Train. Mins.	Train.	m.p.h
G.N. ..	1903	Dundalk—Portadown	33¼	2	44	7·17 a.m. D.	45·3
	1925	Amiens Street—Dundalk	54¼	1	64	3·00 p.m. D.	50·9
G.S. & W.	1903	Maryborough—Kingsbridge	51	2	63	6·22 p.m. U.	48·6
	1925	,, ,, ...	51	2	58	6·42 p.m. U.	52·8
M.G.W...	1903	Mullingar—Broadstone	50¼	3	74	5·58 p.m. U.	40·7
	1925	,, ,, ...	50¼	7	75	6·5 p.m. U.	40·2
N.C.C. ..	1903	Greenisland—Ballymena	26½	1	43	3·47 p.m. D.	36·9
	1925	,, ,, ...	26½	1	38	3·20 p.m. D.	41·8

TABLE C.—FASTEST SCHEDULE DAILY RUNS.

Railway or Section.	Year.	Train.	Miles.	Mins.	m.p.h.
G.N. ..	1903	5.0 p.m. Belfast—Portadown	25	31	49·3
	1925	9.15 a.m. Adavoyle—Dundalk	8¼	9	54·7
G.S. & W. ..	1903	9.17 a.m. Limerick Junction—Mallow	37¼	46	48·6
		6.22 p.m. Maryborough—Kingsbridge	51	63	
	1925	6.42 p.m. Maryborough—Kingsbridge	51	58	52·8
M.G.W. ..	1903	8.21 a.m. Mullingar—Athlone	27¾	38	43·8
	1925	6.5 p.m. Mullingar—Broadstone	50¼	75	40·2

	Miles.	No. of Runs.	Mins.	m.p.h
Amiens Street—Drogheda	31¾	1	35	54·3
		2	37	51·4
		3	38	50·1
Portadown—Belfast	25	3	29	51·7
		5	30	50·0
Amiens Street—Dundalk ..	54¼	1	64	50·9
Drogheda—Dundalk	22½	2	27	50·0

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It is only fair to say that in the early years of the present century the down Killarney express on the G.S. and W.R. (11.0 a.m. *ex* Kingsbridge) was booked to run the 77¾ miles between Ballybrophy and Mallow in 88 minutes, at the rate of 53 m.p.h. There was also an occasional special schedule at holiday times of 2 hours 45 minutes for the 144½ miles between Kingsbridge and Mallow. This included a stop at Ballybrophy for "loco. purposes" —in other words "water." Without making any allowance for this stop, the start-to-stop speed worked out at 52·5 m.p.h., a very good performance over a none too easy road, which has been compared with the G.E. main line via Colchester.

Restaurant car services are shown in Table D. Here the Northern lines show a great improvement, but, as was recently announced in these columns, Pullman cars are promised on the G.S. and W. section, giving an additional six services daily.

Although the final table (Table E) shows a reduction in slip coach services, as has been the case in England, there has been a marked tendency of late towards their re-introduction in larger numbers. After having disappeared completely from the G.S. and W. Section for some years two made their re-appearance last winter, and on the G.N.R. an innovation appears in the shape of a slip at Goraghwood off the Up Limited Mail.

TABLE D.—DAILY RESTAURANT CAR SERVICES.

	Restaurant Car Services.		Buffet Tea Car Services.		Totals.	
Railway or Section	1903	1925	1903	1925	1903	1925
G.N. ..	4	4	—	8	4	12
N.C.C. ..	—	—	—	8	—	8
G.S. & W.	2	4	—	—	2	4
M.G.W. ..	2	2	—	—	2	2
D. & S.E.	—	2	—	—	—	2
Total ..	8	12	—	16	8	28

TABLE E.—SLIP COACHES.

Railway or Section	Year.	Coaches slipped at	1903	1925
G.S. & W.	1903	Ballybrophy (2), Portarlington, Kildare, Sallins.	5	—
	1925	Kildare, Portarlington	—	2
G.N. ..	1903	Malahide, Balbriggan	2	—
	1925	Drogheda, Goraghwood (2)	—	3
M.G.W.	1903	Nil	—	—
	1925	Enfield	—	1
N.C.C. ..	1903	Cookstown Junction	1	—
	1925	Nil.	—	—
		Totals	8	6

It will be seen from the tables that there has been a general all-round improvement in main line services during the last quarter of a century. A great improvement has also taken place in passenger rolling stock. Whereas 20 or 25 years ago corridor bogie stock, with lavatory accommodation, was the exception rather than the rule, nowadays it is to be found on all important main line trains.

The Irish railways, particularly the newly grouped Great Southern, are at present in a very critical financial position, due to the increased cost of labour and competition from road transport. The wonder indeed is that they are able to give as good services as are now in operation.

It is to be hoped that as they surmount their present difficulties and as the country becomes more prosperous after the troublous time through which it has recently passed, still greater improvements will become possible.

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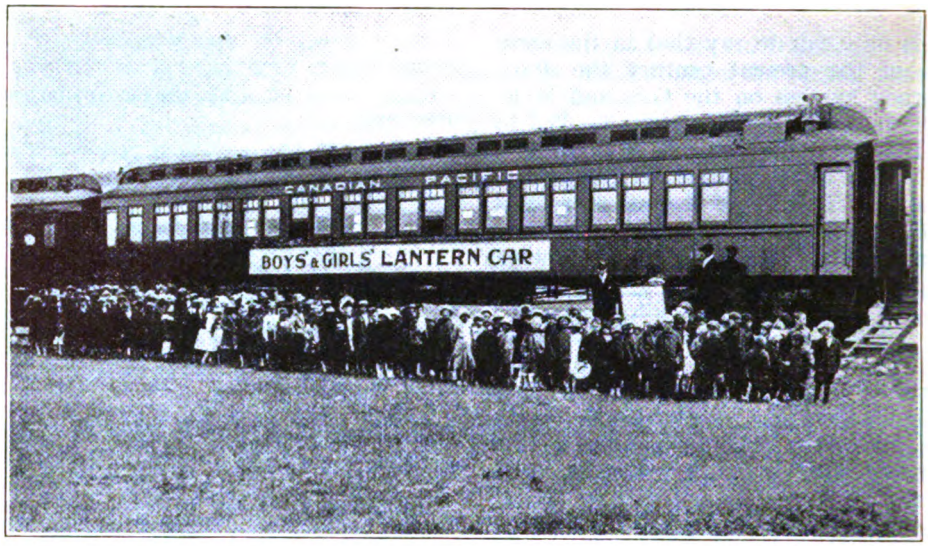

CHILDREN'S LANTERN CAR ON "BETTER FARMING" INSTRUCTION TRAIN.

The "University on Wheels."

By E. L. CHICANOT.

AMONG the many problems considered for the development of the American continent, has been how to give to the rural districts efficient educational facilities, particularly in regard to the many scattered and out-of-the-way communities.

Denser settlement in the United States has tended largely to right the situation as far as it concerns the growing generation. The need still exists, however, and is even more marked in Canada, where, in many places, the problem is very real and pressing.

Education in Canada is framed largely with an eye to the farmer's needs, and the advancement of his industry, and more is done, in an educational way, for the Canadian farmer than for the agriculturalist of any other country. Valuable departments and bureaux are maintained by the various governments to aid him with advice and research. He can get practically anything from them if he asks for it. Agricultural colleges are to be found within reasonable distance of every farming community. But there is another potent educational factor, which has proved more efficacious than others—the "University on Wheels."

A feature peculiar to Canadian national life is the Dominion's extensive railway mileage. It is usual to say that Canada is overbuilt with railways. Certainly, with a mile of railway to 225 people, Canada has a greater *per capita* mileage than any other country of the world. In an economic sense there is no doubt greater mileage than is necessary for the present population, though this is a situation which time will remedy with immigration. Meanwhile it results in a sparse and scattered population being very effectively served with railway facilities. It is the thoroughness with which Canada's rural districts are served by railways that has made the Canadian railways such a powerful educational factor.

Though Canadian agricultural colleges are numerous, merely a relatively small percentage of Canadian agriculturalists receive the benefits of their technical training at these colleges. The necessary expenditure is frequently beyond the means of many farmers, whilst the majority of those financially able to undertake the

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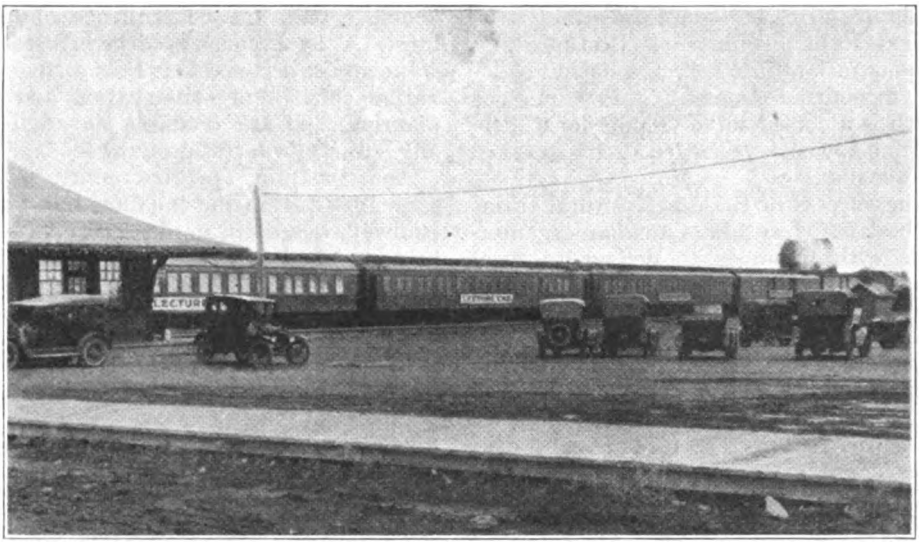
courses cannot spare time away from the farm. It was an appreciation of Canada's generous railway mileage largely that gave birth to the idea of reversing the usual order of things, and instead of bringing the farmer to the college, of taking an agricultural college to the farm.

The idea of the college on wheels did not originate in Canada, though there it has arrived at the highest state of efficiency. About fifteen years ago the Federal government and the Canadian Pacific Railway conjointly planned the first agricultural college train. Every year since "Better Farming Trains" have travelled throughout the rural districts, and their influence upon the Dominion's agriculture has been pronounced.

These trains, sometimes consisting of as many as fifteen cars, are on their itinerary for six weeks or two months, selecting the seasons when the farmer is slackest, and has greater opportunity to visit, and benefit, by them. A great deal of thought and planning are given to the constitution of the train; this being adapted to the territory it is to traverse, whether the farmers there are engaged in dairying, beef raising, mixed farming, corn growing, or any specialised line of agriculture. The railway provides the train, and operates it, free of charge; the government's work being to equip it, provide exhibits, livestock, &c. Agricultural experts accompany the trains. Government and railway mutually arrange the itineraries.

In the main there are two kinds of trains "Better Farming Trains" and "Livestock Improvement Trains." The first contains in its several cars a complete exposition of agricultural training. Every phase of farming is represented, lectures are given, and advice is available upon all branches—seed culture, crop culture horticulture, floriculture, drainage, farm engineering, agriculture, poultry, dairying, maple products, &c. Special cars are devoted to domestic science, and other phases of women's work upon the farm. One car demonstrates the complete work of an agricultural college, to encourage farmers to take the complete course, to enable their sons and daughters to do so. The "Livestock Improvement Train" consists entirely of poultry, dairy products and livestock, its function is to promote a higher and better type of farm animal.



"WEED SPECIAL" AT ASSINIBOINE, SASK.

In addition to these two regular trains, special trains, or cars, are sometimes organised by the government and railways together, for some special campaign of education to the population of the rural districts. Thus, there is the "Wool Car," which gives a thorough demonstration in wool grading, and the "Bacon

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Hog Car," demonstrating the type of animal required for export bacon purposes. The menace from weeds in the Prairie Provinces, has been met by the "Inter-provincial Weed Special" consisting of two lecture cars, a car for the display of implements, one for exhibiting growing weeds, and a tourist-dining car. The train toured Western Canada with the object of arousing public sentiment to the seriousness of the weed menace, and drawing attention to the means of combating it.

The success of taking the agricultural college to the farms cannot be doubted. The advent of the trains is well advertised in advance, they stop a few days at convenient centres, and are invariably the topical focus of interest. Lectures and demonstrations are well, and enthusiastically, attended. As many as 1,000 persons which is a considerable volume for a little farming town, have visited such a train in a single day.

The success of these agricultural trains has been noted by other Canadian organisations with messages to deliver to rural Canada. The Canadian Forestry Association experienced difficulty in adequately reaching the people of the country districts, where its lessons and propaganda were most needed. Forest protection concerns the farmer and rural inhabitant, though frequently they do not realise this until it is too late.

The Association in its endeavour to carry its educational work into the rural districts received the hearty support of the Canadian Pacific Railway, special cars were put at its disposal. Now every year these cars circulate through the wooded provinces of Canada, carrying their propaganda into the heart of the forests, through eloquent picturisation and the lectures of forest experts. Travelling from point to point more than 200,000 persons in a year have visited the train, carried away its message, and transferred it probably to many others.

One section of the car shows a model pulp and paper town with samples of Canada's commercial woods. In another there is a beautiful display of the Dominion's superb water powers, with their relation to forest industries skilfully portrayed. Another car depicts the contrast between agricultural conditions, when the hillsides of a community are covered with timber and the water supply is safeguarded, and those, when these same hillsides have been stripped of forest growth, and erosion has followed. By a clever mechanical arrangement "rainfalls" occur over every district every few minutes. Another exhibit is a very vivid model of a beautiful forest town with its fine stand of timber about it, which by a mechanical device is transformed in an instant to a picture of ugly destruction, intended to impress the beholder with the consequence of forest fires. A lecture-car is attached to the train, and expert speakers hold forth on the various phases of conservation and tree planting, and are available for advice on any subject of forest growth.

Another train, operated jointly by the same Association and the Canadian Pacific Railway, has been an important factor in bringing about the gradual transformation of the bleak prairie stretches of Western Canada to a region of arboreal beauty. This train every year tours the prairie area of Canada, and by its practical demonstrations and lectures has encouraged the planting of shelter groves by farmers, following this up with the distribution of seedlings, and advice as to planting. The train took this propaganda to prairie farmers in a way no other means could have done.

The use of the railway train as an educational factor in rural Canada is continually increasing. Not long ago the Association of Canadian Manufacturers augurated a campaign to encourage the greater consumption in Canada of domestically manufactured goods. Naturally the rural population is the greatest consumer in Canada of any kind of goods. A train was fitted up with Canadian manufactures, and went throughout the country, reaching the people of the rural districts in a more effective manner than any other kind of advertising would have done.

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British Locomotive Practice and Performance.

By CECIL J. ALLEN,
M.Inst.T., A.I.Loco.E.

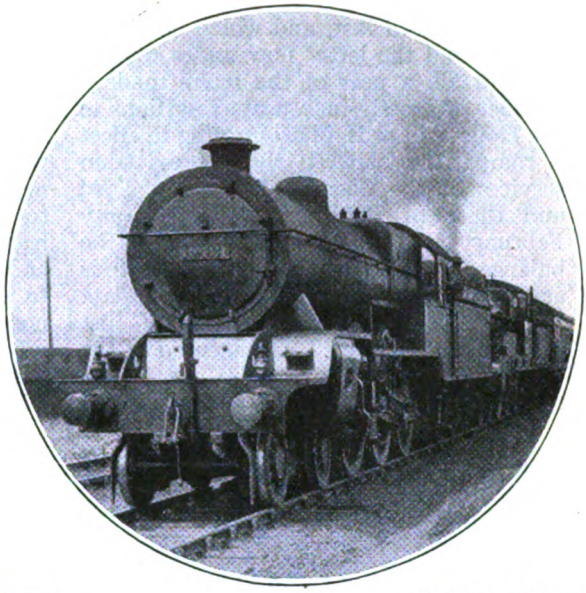

Photo.] [*H. Gordon Tidey*

L.M.S.R. PERTH-LONDON EXPRESS LEAVING CARLISLE.
L. & Y. Section 4-6-0 and "Claughton" type 4-6-0 locomotives.

CORRESPONDENCE continues to reach me, in connection with the work of both the compound "Pacific" locomotives of the French Nord and of their smaller Midland relations of our own London, Midland and Scottish Railway, and the points raised in two of the letters, in particular, deserve ventilation. "Do you not think," writes one correspondent, "that much of the criticism of your articles arises from a difference of attitude between your critics and yourself? By the title of your articles in THE RAILWAY MAGAZINE, their scope is limited, presumably, to locomotive work, whereas the average railfarer, if his journey is to be pleasant, has to consider other factors. It is of little use for the locomotive department to supply a satisfactory machine and a good crew if their efforts are to be negatived by slackness in station work, in signalling, or in control of the traffic generally.

"For example, a few years ago I had to travel frequently from Paddington to Bristol. Locomotive performance was usually excellent, and the run promising as far as Bath or even St. Anne's Park; but then . . .! It may be that the enlargement and improvement of Temple Meads station was overdue; but, in any case, the delays which preceded its entry irritated and inconvenienced the ordinary traveller, who would be inclined to judge the Great Western Railway by the time of arrival rather than by the locomotive work alone. Of the French Nord I have only a war-time experience, and am not, therefore, in a position to judge, but experience of unpunctual running on British railways leads me to place most of the blame for the unpunctuality upon factors other than locomotive work. The traveller, however, does not, as a rule, care *whence* the delay comes; his judgment is based on the fact that the promises of the time-table have not been fulfilled."

For my friend's temperate statement of his case I have nothing but appreciation, but for all that, I fail to see how such considerations can be expected to affect the character of these articles. As he himself mentioned, that character is determined by their title, which is not "Time-tables and Their Observance," nor even "British Express Train Services," but "British Locomotive Practice and Performance." Let us briefly retrace the course of the arguments and data which led up to that indignant letter with which

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I dealt in April last, and which doubtless has inspired the letter now under review. First of all, a peer of the realm made a number of grossly inaccurate assertions in the House of Lords, in attempting to effect a comparison between the express train services of the Chemin de Fer du Nord and those of British railways. In my February article I sought to redress the balance by giving details of what is actually being done on the Nord to-day. This elicited the vigorous rebuke just referred to, in which I was accused of the "frantic glorification of mere speed" on the Nord, without regard to such neglected essentials of travelling comfort as punctuality, smooth riding and cleanliness, and to which I essayed to reply in April.

In this connection I will venture to diverge for a moment from what is my proper subject, in order to make a few observations arising out of a recent journey across France into Southern Switzerland, immediately after Easter. The punctuality of the running in every direction struck me as extraordinary; on the outward journey we were 2 min. late into Paris; dead on time into Basle and Lugano; on the return journey, leaving Lugano 5 min. late on the day of a national *fête*, we were a minute early into Lucerne; dead time was maintained from Lucerne to Basle; over the Est into Paris our "Pacific" driver, after a brilliant start from Troyes, scarcely knew how to fill in his time to Paris, and after innumerable signal delays in the last ten miles, ran in nearly 5 min. early; while from Paris to Calais we lost 7 min., owing to being all but stopped, with a 500-ton train, at Marquise, right at the foot of the ascent to Caffiers. Furthermore, all the trains noted at various points, both internal and international, appeared to be running practically dead on time.

In regard to comfort, a revolution appears to have been effected in the character of the riding on the Nord, which was perfectly smooth, even at the highest speeds (we exceeded the legal maximum speed by touching 80 m.p.h. on one descent), and would, indeed, give points to some of our main lines at home. On the Est I succeeded in sleeping soundly, which I never manage to do in this country, although it must be conceded that perfect familiarity with each route traversed here makes it difficult to detach one's mind from the line at night, and so to fall asleep. Cleanliness was unexceptionable, staff being carried specially on a number of the trains by which we travelled, in order that this essential

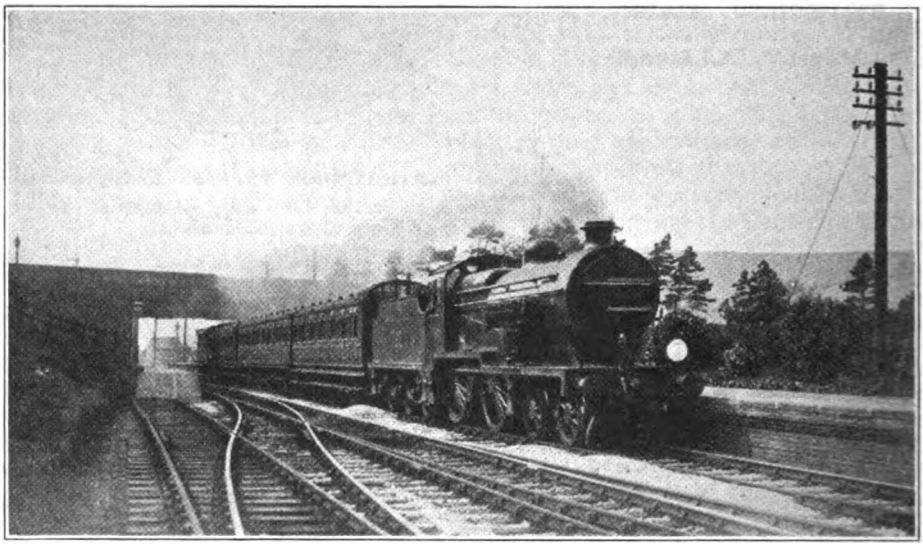

Photo.] **BRIGHTON-ASHFORD TRAIN PASSING GLYNDE, S.R.** [*J. L. Lyon.*

S.E.C.R. 4-4-0 locomotive No. A782.

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might be attended to throughout the journey—a practice which obtains on but few trains in this country. As regards such creature comforts as meals, one would go far, I think, to beat such a lunch as that served in palatial—and British built, one is proud to note—cars, on the midday services in each direction between Paris and Calais. I mention these facts, outside the scope of these articles though they may be, in order, first, to refute the soft impeachment that the amenities of travel have no attraction to the recorder of locomotive performance, as compared with "mere speed," and, second, to contradict the widely-held belief that speed and comfort in express train travel are the exclusive monopoly of Great Britain.

The second letter, from a resident in Birmingham, has much to say on a very similar line to that of the first—that is, the outlook of the average traveller. "Having been a regular passenger for many years on the two-hour trains between Euston and Birmingham," the writer begins, "I have been able to form quite a practical idea of locomotive efficiency; and I have no hesitation in stating that since the advent of the Midland compounds the service has deteriorated considerably. A few weeks prior to last Christmas the time-keeping was very bad. On the 5.50 p.m. out of Euston, to which I refer particularly, we arrived one night at Birmingham 30 min. late, and a few nights afterwards 20 min. late. On both occasions we nearly came to a dead stand in ascending Camden bank, and the running throughout was decidedly sluggish. I discussed the matter with both drivers (and on the second occasion there was an inspector on the footplate), and both agreed that the task allotted to the engine was beyond its capabilities.

"It seems to me that the Midland compounds suffer to some extent from the same fault as the Webb compounds, in being sluggish starters, although their maximum speed capabilities may be as high as or higher than those of the "George the Fifth" class. In any case, when the London and North Western engines were working the service so satisfactorily, it seems an absolute puzzle to me that they could not be left alone to continue the good work. And especially in such a case as that of the 5.50 p.m. out of Euston, it does seem unbusinesslike to put on this train an engine of doubtful capacity, when there are three other important expresses just behind, being seriously delayed night after night, and entailing annoyance with

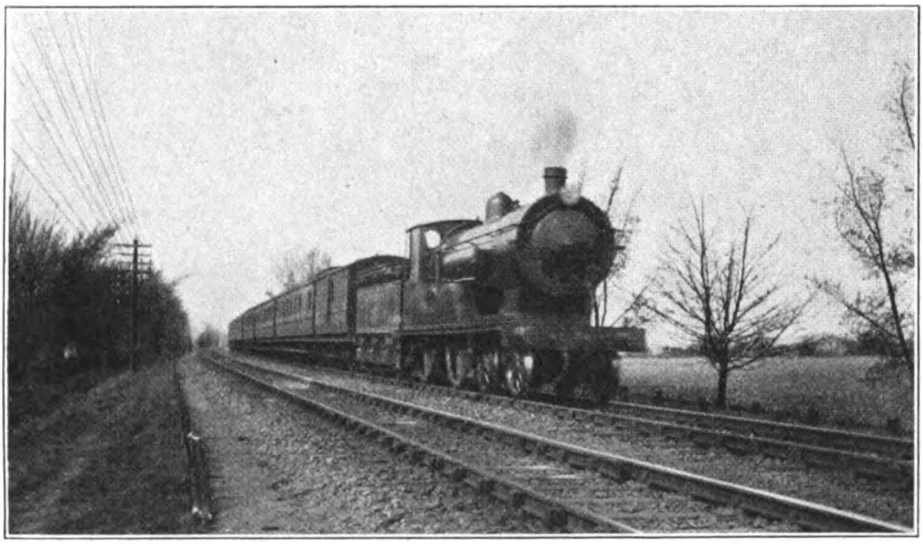

Photo.] [*R. D. Lund.*

S.E.C.R. SECTION TRAIN HAULED BY L.S.W. 4-4-0 LOCOMOTIVE NO. 417E.

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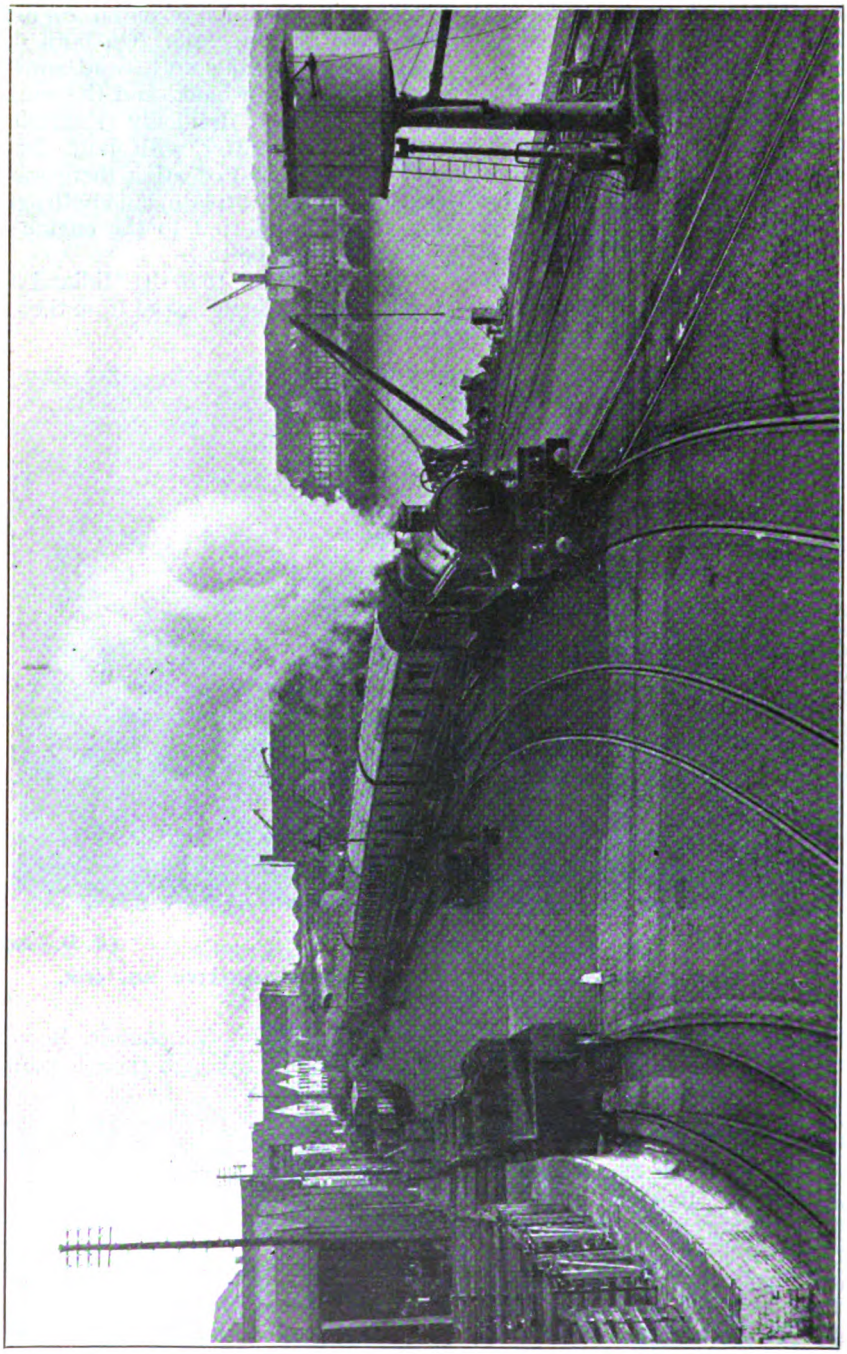

Photo.] DEPARTURE OF AMERICAN HOTEL MANAGER'S SPECIAL TRAIN FROM PLYMOUTH DOCKS, G.W.R. APRIL 9, 1926. [*Topical.*

4-6-0 Locomotive No. 4081 "Abbotsbury Castle."

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consequent loss of prestige by the railway. Perhaps you can throw some light on the matter."

Here, again, is a most temperate letter from one who has every reason to be interested in the performance of the compounds. But does not this letter also tend to "beat the air"—to some extent at least? I have never disputed the falling off of service to which my correspondent refers; on the contrary, an article such as that of April lays stress upon the deterioration. But I have sought to prove that the fault lies rather with the handling than with the machines. A driver responsible for one of the finest efforts figuring amongst the compound runs described between Euston and Birmingham told me that since he had been given compounds to work in place of "Georges," he had had no time booked against him; that his coal consumption was considerably lower than it had been with a "George," although he had to be careful with his water; and that, so far from having any complaint to make against the compounds, he liked them well. This was the driver on the brilliant run described last month. If one driver can succeed—and he is but one of a number who have proved, by my records, that the compounds are fully equal to the maximum demands of the Birmingham service—then why not the others?

If I might venture to diagnose the complaint, its causes are twofold. When the compounds first appeared on the Western Division, it is open to question whether the drivers were sufficiently instructed as to the correct method of handling them, and endeavours to drive them in exactly the same way as they would drive their own simple locomotives—particularly in view of the peculiar construction of the Midland regulator—resulted in loss of time in every direction. Since then a number of the drivers appear to find it well-nigh impossible to break away from traditional methods of driving, and such methods will never—indeed, *can* never—get the best work out of the engines. The compound cannot be "thrashed," and for that reason would be a useless engine on such heavy turns as were once worked by the "Georges" between Euston and Crewe, when coal consumption was a matter of secondary importance, as we were reminded last month in the discussion on the "large" *versus* the "small" engine.

But the design has been multiplied with a view to economy both in coal and maintenance—which is so vital to-day—and

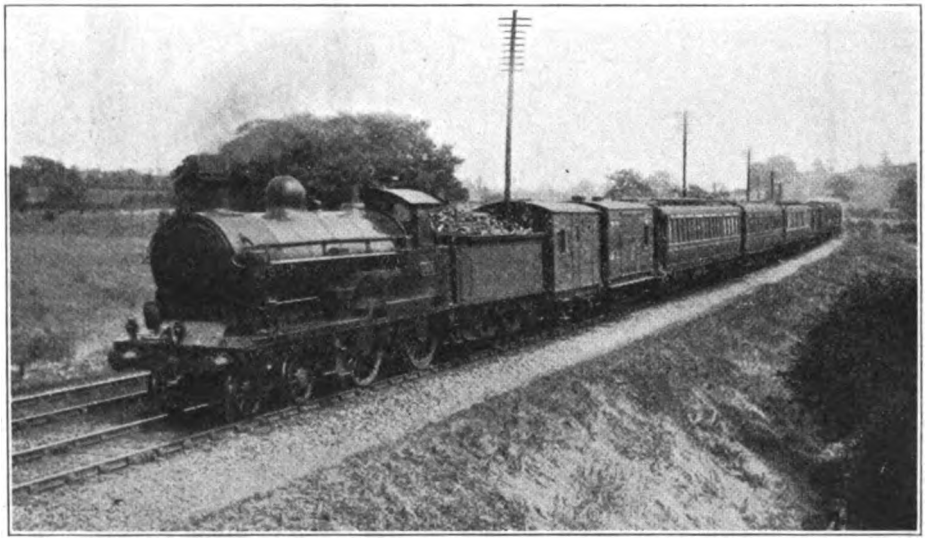

Photo.] L.M.S. STOCK TRAIN NEAR BLISWORTH. [*J. Dearden.*

L.N.W. 4-4-0 No. 1472, "Moor Hen," fitted with Weir Feed Water Heater.

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if it is capable of keeping time with 250-ton trains on the fastest schedules between London and Leicester or Nottingham; if, furthermore, it is giving every satisfaction on the express services between Carlisle and Glasgow, by both Caledonian and Glasgow and South Western routes, in substitution for the previous simple 4-4-0 and 4-6-0 engines; it ought, then, to be the ideal proposition for the moderately-loaded expresses between Euston and Birmingham. Getting away from rest is not the strongest point of the compounds, but it is possible that some improvement might be effected if means could be devised to do away with the drastic throttling, when the engine is starting, of the steam as it passes through the jockey valve on the back of the regulator to the low-pressure cylinders, and if, by such an alteration, it were possible to work the engine simple over a longer distance from the start, before reverting to full compound working. Far more powerful express engines are, of course, required for the heavy express services between Euston, Crewe and Carlisle, to avoid the necessity for constant piloting; and the four-cylinder compound "Pacific" design now in course of preparation at Derby should be capable of all that is required in this direction, when at long last it makes its appearance.

To sum up the foregoing discussions, may I say that I yield to none of the readers of these articles in my appreciation of punctual running—on which the transaction of my own business affairs depends as much, and probably more, even than their's—as well as of every comfort and amenity by which travel as a whole is judged? For one who spends so large a proportion of his existence in trains any other travel outlook would be impossible. There is no question, therefore, of any "difference of attitude," as between myself and those who honour me by reading these articles. But at the same time I must reiterate—spite of a wide latitude granted by an indulgent Editor—that the design, construction and performance of locomotives must, in view of the title of these articles, constitute their subject matter. Readers who are interested solely in those particular aspects of comfort which appeal to travellers, should, I submit with all respect, confine their attention to other writings than mine, and should hesitate before reproaching me with concentration on "mere speed," and all in the construction of the locomotive that

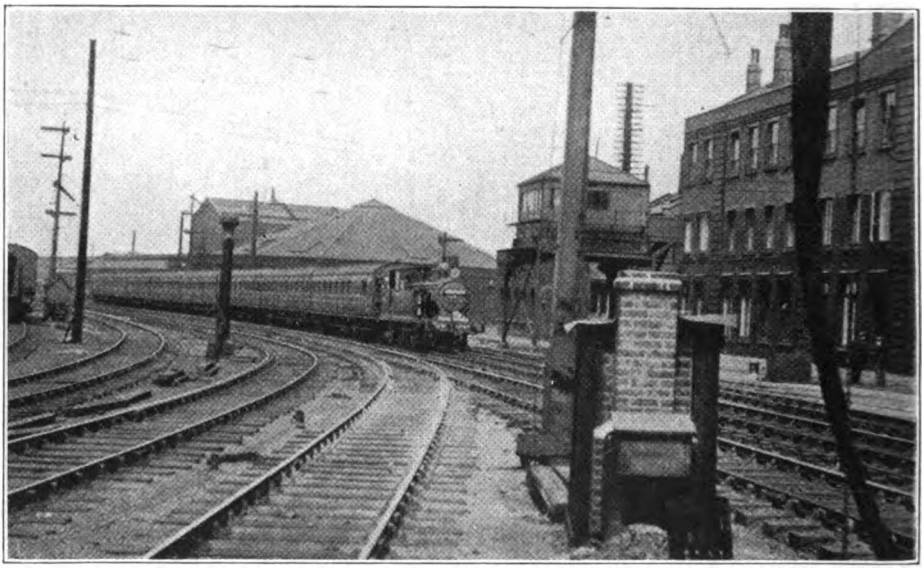

Photo.] [*J. F. Gairns.*

LOUGHTON-LIVERPOOL STREET TRAIN PASSING STRATFORD WORKS.

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bears on its attainment and maintenance. In regard to the matter of the "large" as opposed to the "small" engine, I have had a further highly interesting letter from Monsieur G. Vuillet, of Paris, detailing what is being done with the recently introduced 4-8-2, or "Mountain"-type express engines on the Est and P.L.M. Railways in France. "These engines are giving complete satisfaction," he writes, "and a large number are to be built. The Est engine is as powerful per unit of weight as a Nord 4-4-2, and in regard to high-speed downhill running it would be difficult to beat with any 4-6-2." As an example of its work, he cites a run from Troyes to Paris, with an 18-coach train weighing 647 tons empty and 680 tons full, on the section from Flamboin to 78 km. This rises at approximately 1 in 166 between 95 and 78 km., save for a level strip between 90 and 88 km. No. 41.001 passed Flamboin at 62 m.p.h., fell to 51 on the first 5 km. of the grade, rose to 58 on the level 2 km., and fell to a sustained 47¼ m.p.h. up to the summit, having surmounted the complete 17 km., with 680 tons behind the tender, in 12 min. 29½ sec., at an average speed of 50·8 m.p.h. This is equivalent to climbing from 7 to 27 km. out of Paris on the Nord at an average speed of 55 m.p.h. with a 700-ton train; and the average horse-power output could not have been less than 2,700. The same engine has been timed to attain a speed of 62·1 m.p.h. in 1¾ miles from the start, with a 700-ton train, the only assistance being afforded by a 1 in 166 down-grade for a few hundred yards from the point of starting.

The corresponding P.L.M. engine—No. 241.A.1—has actually attained 37·3 m.p.h. from a dead start *up* a grade of 1 in 125 with a train of 572 tons. Another extraordinary effort, with a train of 435 tons, up the formidable climb from Dijon to Blaisy Bas, was to attain 53½ m.p.h. on the initial 5½ miles at 1 in 166 to Velars, to fall only to 50 in the early stages of the succeeding eight miles at 1 in 125 to Bauline la Roche, after which speed *rose* to 56 m.p.h. on the same grade, ere the summit tunnel was entered! Suffice it to say that the schedule of 33 min. from Dijon to Blaisy Bas was cut by 33 per cent. to 20 min. 42 sec., despite an easing of the engine to 53½ m.p.h. up the final 1 in 250 through the tunnel. A maximum rate of 70 m.p.h. has been attained by this P.L.M. monster, in spite of eight-coupled wheels of only 5 ft. 10¾ in. diam. "Such performances as the above," my friend

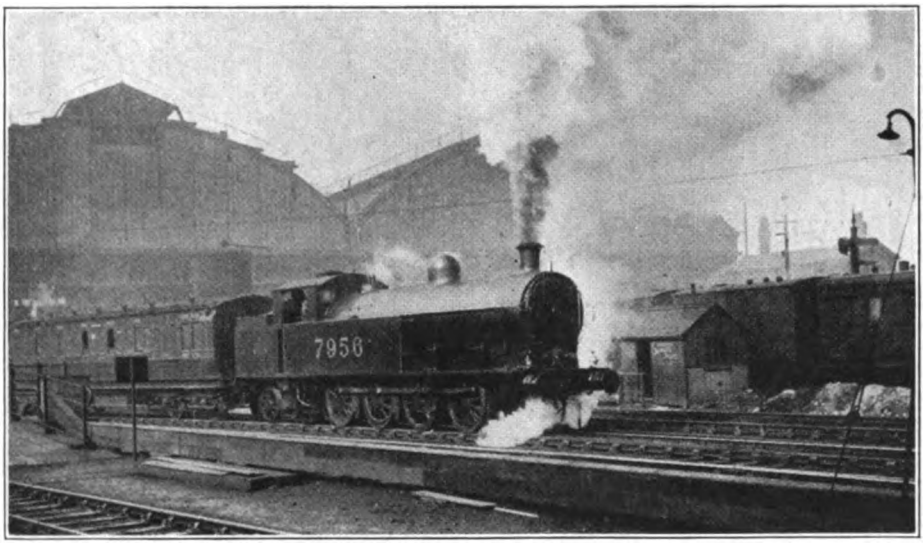

Photo.] [*R. D. Pollard.*

MANCHESTER-BUXTON TRAIN LEAVING MANCHESTER (LONDON ROAD).
L.N.W. Section 0-8-2 Tank Engine No. 7965.

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adds by way of comment, "made with ordinary trains in the recovery of lost time, throw a new light on express locomotive performance."

In his letter M. Vuillet calls attention to a slight error which has crept into the table of "minimum" times between Paris and Calais appearing in my April article. It affects all the distances given in the table from Boulogne (Tintilleries) to Calais inclusive, and arises out of the fact that the distances in the Nord working-book are calculated *via* the two sides of a triangle, into and out of Boulogne (Ville), instead of by the spur taken by the direct trains to Calais. All the distances from Boulogne to Calais should therefore be reduced by 9·6 km., or 0·4 mile, making 75·3 miles from Abbeville to Calais, and 184·3 miles through from Paris to Calais. This will explain, incidentally, the shortness of the times shown in my tables between Pont-de-Briques and Tintilleries, which appeared, I must confess, to indicate a much higher than desirable speed over the Outreau Junction at Boulogne, but which, over the shorter and correct distance, show that the necessary reduction of speed was duly effected.

Another minor error in my article of last month has brought in letters from a number of correspondents, and I hasten to correct it. Southern Railway engines Nos. 444 and 156 of the Eastern Division, which figured in my footplate journeys to and from Dover, are both Stirling (South Eastern) 4-4-0's, rebuilt with domed boilers, and not Kirtley engines. Owing to the unusual circumstances of the run, my observations were very hasty, and some excuse is therefore afforded for the misstatement.

And now for a few runs on the Dover and Folkestone boat expresses, for which readers have been so anxiously waiting. In the table reproduced herewith, the second and third down journeys were made on the 10.45 a.m. Pullman relief express, while the first was on the 9 a.m. Folkestone service; the serious signal delays in the last-mentioned case are accounted for by the fact that it was the Thursday before Easter, the corresponding post-Easter up journey, in the middle column of the up runs, being similarly hampered. My own journeys were behind *Sir Balin* on the down journey, and *Sir Prianius* on the up, the remainder having been recorded by correspondents; and I have added, by way of comparison, an "L" class 4-4-0 run, in the final column, with one of the Folkestone 80-minute

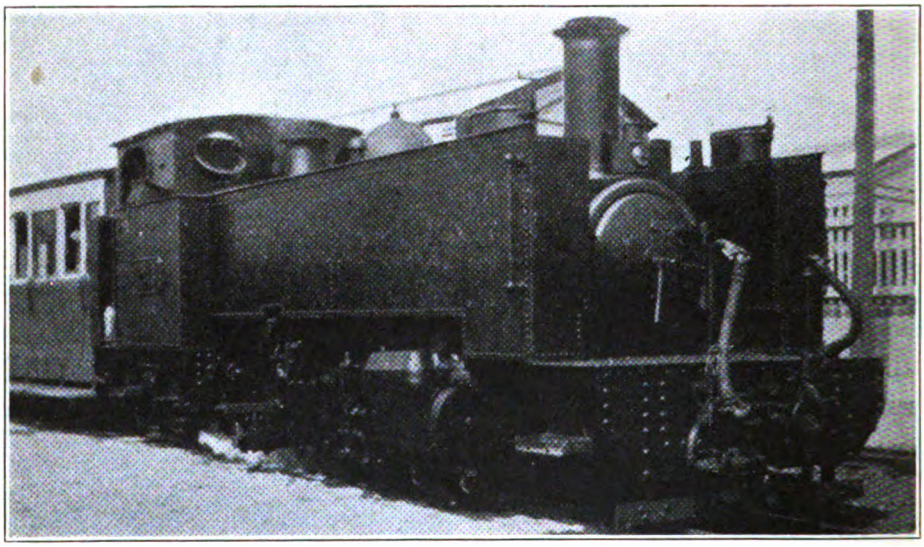

Photo.] **VALE OF RHEIDOL LOCOMOTIVE.** [*W. R. Alderton.*

Repainted and lettered in G.W.R. Style.

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corridor trains, loaded to the very maximum figure—300 tons—that these engines can be expected to handle to time on such a booking. This also was recorded by a correspondent.

Out to Knockholt *Sir Sagramore*, beset before and behind with relief trains, and checked by signals through Sydenham Hill and Beckenham, took things in a leisurely fashion, falling to 25 m.p.h. on the 1 in 95 to Bickley Junction, and to 27 on the 1 in 210 to Knockholt. But a maximum of 73 m.p.h. was maintained in descending to Tonbridge, and after the slack there, speed was kept at between 64 and a maximum of 68 m.p.h. from Paddock Wood to Headcorn, after which it fell to 55 on the 1 in 244-266 ascent before Pluckley, where a further very severe signal check was experienced. From this a recovery to 58 was effected through Ashford, and speed did not fall below 50 an hour on the rise from Ashford to Westenhanger, which culminates with 4 miles at 1 in 276. After that came still worse signal delays to Folkestone.

The down run recorded by myself was a good time-keeping performance to Knockholt, but from there to Ashford 3 min. were dropped by somewhat slack running, despite the fact that there was not a single check of any sort; we arrived punctually, however, at Dover. Speeds were 26 m.p.h. on the 1 in 101 up to Sydenham Hill, 32 at Bickley Junction, and, after a slack round the Bickley curve, 27½ at Knockholt; we were severely braked in descending to Dunton Green, not exceeding 57½ m.p.h., fell to 47 at Sevenoaks Tunnel, and rose momentarily to 70½ through Hildenborough, prior to Tonbridge slack. Speed ranged

SOUTHERN RAILWAY: VICTORIA—DOVER (MARINE).

771, *Sir Sagramore.* 410 440	768, *Sir Balin.* 412 435	772, *Sir Percivale.* 425 450	Schedule.	Distance.	Engine, 4-6-0, No. „ Name Load (tons tare) „ (tons full)	Distance.	Schedule.	770, *Sir Prianius.* 412 435	765, *Sir Gareth.* 392 425	779, 4-4-0 285 300
m. s.	m. s.	m. s.	min.	miles.		miles.	min.	m. s.	m. s.	m. s.
0 00	0 00	0 00	0	0·0	Victoria ..	78·0	108	(Charing	Cross)	86 38
9 20	9 15	9 50	9	4·0	Herne Hill ..	74·0	101	(London	Bridge)	80 43
Sigs.										Sigs.
14 15	12 55	14 00	—	5·7	Sydenham Hill	72·0	—	(New	Cross)	73 19
19 15	17 20	19 20	17	8·7	Beckenham Jc.	69·3	92	(Hither	Green)	70 57
								Sigs.		
26 45	23 40	26 10	24	12·6	Bickley Jc. ..	65·4	86½	92 05	Sigs.	*66 53
31 55	28 15	31 10	29	14·9	Orpington ..	63·1	82½	88 05	70 50	64 36
36 55	33 10	36 00	33	17·6	Knockholt ..	60·4	78½	84 55	67 45	61 43
42 20	38 55	41 25	—	21·6	Dunton Green	56·4	—	78 55	62 20	56 37
43 55	40 40	43 25	40	23·1	Sevenoaks ..	54·9	71	77 05	60 30	54 53
48 50	45 50	49 10	—	28 0	Hildenborough	50·0	—	65 15	49 40	46 09
51 35	48 45	52 10	48	30·6	Tonbridge† ..	47·4	58	60 35	45 00	42 35
58 00	55 20	58 15	54	35·9	Paddock Wood	42·1	52	55 20	39 10	37 02
62 20	59 55	62 40	—	40 5	Marden ..	37·5	—	51 15	35 10	32 40
64 40	62 35	65 10	61	43·0	Staplehurst ..	35·0	45	48 55	33 00	30 13
67 40	65 55	68 20	—	46·3	Headcorn ..	31·7	—	46 00	30 15	27 16
73 10	72 10	73 50	—	51·6	Pluckley ..	26·4	—	41 00	25 35	22 31
Sigs.										
82 20	78 10	79 20	75	57·2	Ashford ..	20·8	31	33 50	21 10	17 16
								Sigs.		
87 10	82 40	83 30	—	61·5	Smeeth ..	16·5	—	29 10	16 15	13 21
91 30	87 10	87 35	—	65·2	Westenhanger	12·8	—	24 55	12 30	9 32
92 50	88 40	89 05	87	66·5	Sandling Jc. ..	11·5	21	23 00	10 50	8 07
Sigs.	92 40	93 00	—	70·4	Shorncliffe ..	7·6	—	16 30	5 50	2 17
Sigs.	93 15	93 35	—	71·1	Folkestone Cnt.	6·9	—	15 20	3 35	0 00
—	94 15	94 40	93	72·0	Folkestone Jc.†	6·0	12	13 45	0 00	—
—	101 40	102 10	102	78·0	Dover Marine	0·0	0	††0 00	—	—

* Passing time at Chislehurst. † Service slack.
†† Folkestone Junction Sidings, ¼-mile east of station.

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between 61½ and 57 an hour from Paddock Wood to Headcorn, fell to 47 before Pluckley (this was poor, and accounted for most of the lost time between Tonbridge and Ashford), and rose again to 61½ through Ashford, after which a minimum of 47 at Westenhanger and very restrained running from Sandling down to Dover completed the journey in booked time. My correspondent's run on the same train with *Sir Percivale* had a mediocre start, 4¼ min. being dropped to Tonbridge, but time was kept from there on to Ashford, after which the lost 4 min. were regained to Dover. The 35·2 miles from Paddock Wood to Folkestone Central were run, with this 450-ton trainload, in 35 min. 20 sec.

My up run behind *Sir Prianius* was disappointing. On the 12-mile rise at 1 in 264, which commences a little over ½-mile from the start, and extends to between Sandling and Westenhanger, we accelerated very slowly, passing Folkestone Central at 35½ m.p.h., Cheriton Junction at 36½, Sandling at 37½, and Westenhanger at 38½. We had then attained 66 an hour, and were going well, when there came the unfortunate Ashford check. From this we recovered to 61½ m.p.h. at Pluckley, and 71½ at Headcorn, speed reaching a maximum of 70½ again at Paddock Wood, with an intervening minimum of 65 at Staplehurst; we ran very smartly, too, to the Tonbridge slack, having covered the 21

SOUTHERN RAILWAY: VICTORIA—BRIGHTON.

Distance.	Engine No. ..	Schedule.	41	424	425	421	330	330	424	39
	,, Type ..		4-4-2 N	4-4-2 S	4-4-2 S	4-4-2 S	4-6-4 T	4-6-4 T	4-4-2 S	4-4-2 N
	Load (axles) ..		38	42	42	42	46	44	—	44
	,, (tons tare)		290	310	320	320	311	332	275	332
	,, (tons full)		300	320	340	340	340	350	300	350
miles.		min.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
0·0	Victoria ..	0	0 00	0 00	0 00	0 00	0 00	0 00	63 20	63 10
									sigs.	sigs.
2·7	Clapham Junct.	6	5 40	6 14	5 45	5 35	5 51	5 50	55 10	57 10
4·9	Balham ..	9	8 20	8 53	8 20	8 10	8 31	8 40	52 40	53 50
										sigs.
6·8	Streatham Common	—	10 55	11 20	10 40	10 45	11 07	11 20	50 25	51 25
8·7	Thornton Heath	—	p.w.s. sigs.	13 40	13 00	13 20	13 34	13 55	48 00	48 40
						sigs.		p.w.s.	p.w.s.	p.w.s.
10·5	East Croydon..	16	16 35	15 45	15 10	15 45	15 55	17 15	45 10	45 45
										sigs.
13·6	Purley ..	—	20 35	19 07	18 40	20 00	19 28	21 40	42 05	42 45
15·0	Coulsdon ..	21	22 15	20 48	20 20	21 55	21 10	23 35	40 40	41 25
18·8	Quarry Box ..	—	27 27	25 25	25 00	27 17	25 55	28 45	36 10	37 15
21·9	Earlswood ..	29	30 25	28 17	28 05	30 20	29 03	31 50	32 20	33 45
									eased	
26·0	Horley.. ..	—	34 20	32 03	31 45	33 45	32 47	35 35	28 05	29 40
29·6	Three Bridges	37	37 40	35 52	35 05	36 55	36 19	39 15	24 55	26 15
31·9	Balcombe Tunnel (B)	—	40 12	38 51	37 55	39 33	39 00	42 05	22 30	23 00
										sigs.
34·1	Balcombe ..	—	42 25	41 18	40 15	41 50	41 17	44 25	20 05	20 20
						sigs.				
38·0	Hayward's Heath	46	45 45	45 04	43 55	48 35	44 44	48 05	16 05	16 25
						sigs.	p.w.s.			
41·2	Keymer Junct.	49	48 25	48 03	46 40	53 31	—	50 55	13 30	13 40
				sigs.	eased	sigs.	sigs.			
43·8	Hassocks ..	—	50 50	51 35	49 20	56 50	51 44	53 35	11 10	11 15
46·2	Clayton Tnl. (S)	—	53 05	55 06	52 20	60 20	—	56 05	8 45	8 45
49·6	Preston Park	—	56 40	59 11	56 40	64 23	59 31	59 30	3 45	3 50
						sigs.				
50·9	Brighton ..	60	59 10	61 24	59 10	67 00	62 19	61 45	0 00	0 00
50·9	Net times (min.)	60	57½	60	59¼	58	59	59¾	58¾	58

N = Non-superheated. S = Superheated. T = Tank. (B) = Tunnel box.
(S) = South portal of tunnel.

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miles from Pluckley in 19 min. 35 sec. But the ascent to Knockholt was far from inspiring, nearly 4 min. being dropped on schedule time; speed fell from 38 to 23½ m.p.h. on the 1 in 122 up to the mouth of Sevenoaks Tunnel, and was maintained at about that figure on the 144 through the tunnel; then, after a rise to 54 at Dunton Green, our minimum up to Knockholt was 32½ m.p.h. Now 5½ min. late, despite our punctual start, we lost our "turn" in the suburban area, and arrived at Victoria 12 min. late.

By far the best running in the table was that of *Sir Gareth* in the second up column. Up the shorter distance from Folkestone Junction sidings to Sandling, the engine accelerated with this 425-ton train to 42 m.p.h., and then ran brilliantly on to Tonbridge, averaging 67·1 m.p.h. over the 25·6 miles from Smeeth to Paddock Wood, with maxima of 68 m.p.h. at Ashford, no less than 75½ at Headcorn, and 68½ at Paddock Wood, and minima of 58 on the rise after Ashford, and 52½ on that which precedes Tonbridge. The Tonbridge slack was to 34 m.p.h., and subsequent speeds were 37½ at the foot of the 122, 26½ into and 27½ out of Sevenoaks Tunnel, 56½ at Dunton Green and 35½ at Knockholt; dead time had been kept to Orpington (allowed 71 min. on this service), but once again signal checks ruined the conclusion of the run.

The principal feature of No. 779's work, after allowing for her lighter load, was the superior work performed from Tonbridge up to Knockholt, which occupied 5¼ min. less than the time of the first run, and 3¾ min. less than that of the second; but it is only fair to add that at least a minute of this, if not more, was due to a far higher speed over Tonbridge Junction. The 40·5 miles from Folkestone start to Tonbridge were covered in the excellent time of 42 min. 35 sec.—although even this represented a loss of 1½ min. on the exacting schedule—the average speed from Smeeth to Paddock Wood in this case being 64·2 m.p.h., with a maximum of 70½ m.p.h. at Headcorn. The lowest rate on the 1 in 122 to Sevenoaks Tunnel was 32½ m.p.h. The train passed New Cross 2¼ min. late, and apart from signal checks would probably have reached Charing Cross in about 82 min. It will be intriguing this summer to see if the new "L" class engines have any more in hand on these exceedingly difficult Folkestone turns, enhanced in difficulty since the introduction of the weighty corridor stock.

Lastly, I have a table of runs on the

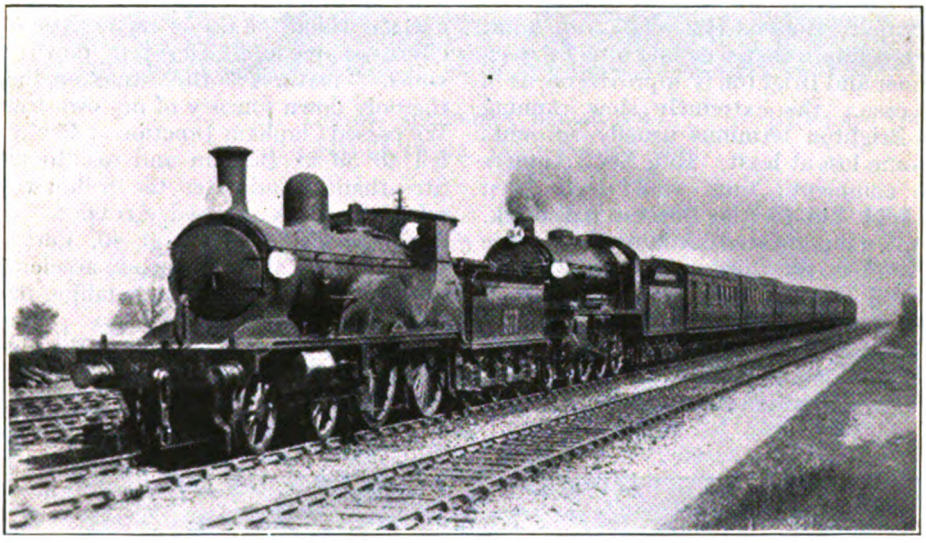

Photo.] **DOWN BOURNEMOUTH EXPRESS, S.R.** [*H. J. Ashman.*

L.S.W. 4-4-0 No. 677 and 4-6-0 No. 755 "The Red Knight."

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60-minute trains between Victoria and Brighton, to eke out the scanty mention of the Brighton services appearing in the last issue. It will be noted that, although no particularly brilliant features of running are included, these journeys were all made with substantial loads, ranging from 300 to a maximum of 350 tons.

Most of the runs were timed by correspondents, and in certain instances only have they noted maximum and minimum speeds in their logs. No. 41, a non-superheated "Atlantic" of the first series, gained slightly on time with 300 tons, despite checks between Streatham and Croydon; maintained speed to Quarry Tunnel was 43½ m.p.h., and the average from Copyhold Junction to Burgess Hill was 72 an hour. It is but rarely that schedule time between Keymer and Brighton is improved on, as in this case; the extremely slow running into Brighton terminus usually accounts for some loss at least. Run No. 2 requires little comment; time would have been just kept but for the Burgess Hill slack. No. 425, a superheated "Atlantic," did some fine work in the third run, being 2¼ min. ahead of time at Keymer, despite a load of 340 tons. Minimum rate into Quarry Tunnel was 47½ m.p.h., and maximum at Horley 71½; minimum at Balcombe was 58 and maximum at Wivelsfield 72½, after which the engine was eased, breasting the rise through Clayton Tunnel at a minimum of 45½ an hour. No. 421, on the fourth run, was badly delayed by signals, but ran well intermediately. Speeds were 39 m.p.h. before Quarry and 73½ at Horley, after which came the checks.

Of the "Baltic" tank runs, No. 330's first was on the 6.35 p.m. down, the large proportion of crowded non-corridor stock in the "rake" accounting for the substantial addition to tare in respect of passengers and luggage. Quarry Tunnel was entered at 44 m.p.h., and the 16·1 miles thence to Hayward's Heath were run in 14 min. 41 sec., or 1¼ min. inside schedule; after this came a couple of checks, which the driver made little or no effort to recoup. The last down run, which "features" the same engine, is the only down journey of my own timing. We passed Clapham Junction at 45 m.p.h.; fell to 39 at Balham and rose to 50 at Streatham; and after the Selhurst p.w. relaying check, passed Croydon at 37 m.p.h., South Croydon at 40, Purley at 45½, Coulsdon at 46—a steady acceleration on the 1 in 264—afterwards falling to 41½ on the steeper ascent to Quarry. Maxima were 70½ m.p.h. at Horley, 68 at Wivelsfield and 67 at Preston Park, with intervening minima of 50 at Balcombe Tunnel and 54

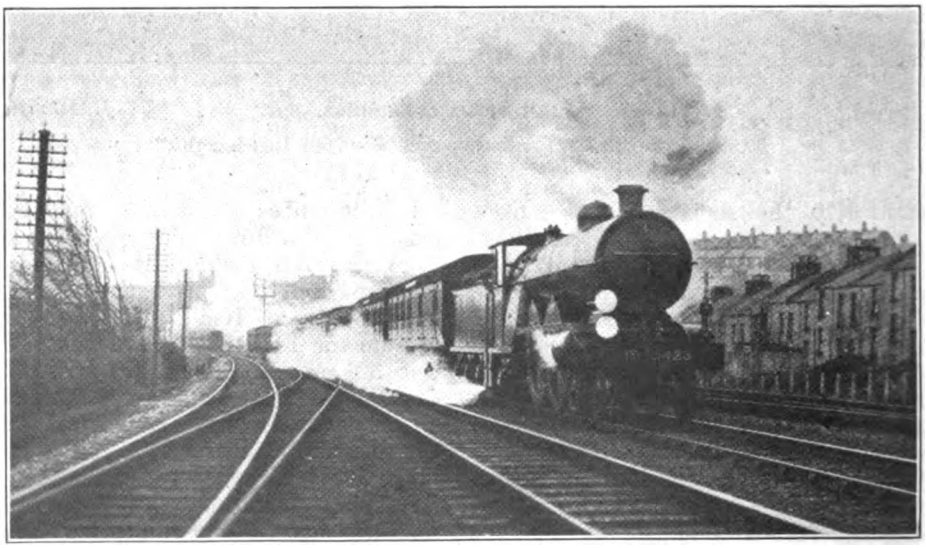

Photo.] UP CITY EXPRESS, S.R. [*H. Gordon Tidey.*

L.B.S.C. 4-4-2 No. 423.

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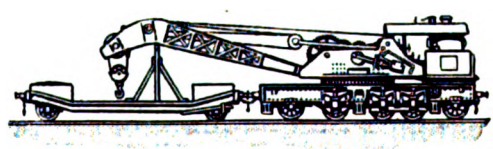
Photo.] DOWN SOUTHERN BELLE, S.R. [*H. Gordon Tidey.*

L.B.S.C. 4-6-4T No. 333, "Remembrance."

at Clayton, whereby on this run also we slightly economised on schedule from Keymer to Brighton.

No. 424—a superheated "Atlantic"—started well on my first up journey, attaining 47½ an hour on entering Clayton Tunnel; later we passed Keymer at 75, Balcombe Summit at 53 and Horley at 70½. The engine was then eased and we fell to 43 an hour in Quarry Tunnel, after which signal checks spoiled the conclusion of the run. Non-superheated No. 39 also did well—better, in fact—with her heavier 350-ton train. On this occasion we again entered Clayton at 47½ an hour, and then passed Keymer at 72½, but our minimum of 53½ at Balcombe was rudely lowered by a signal check to 30 m.p.h. This prevented us from exceeding 67 m.p.h. at Horley, but we went excellently up to Quarry, with a minimum of 49 m.p.h. in the tunnel, and forthwith accelerated to 70½ m.p.h. at Purley Oaks, where a series of signal checks again marred the conclusion of the journey. When the promised batch of "King Arthurs" materialises on these services during the present summer, it will be highly interesting to compare their work with such heavily-loaded "Atlantic" and "Baltic" efforts as those just described.



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London and South Western Locomotives.

REFERENCE to the locomotives of the late London and South Western Railway in the April RAILWAY MAGAZINE has produced a large number of letters, and the resulting information, presented in condensed form below, will no doubt be appreciated by our readers generally. It will be understood-however, that we cannot attempt a descrip, tion of individual classes in detail. The headings set forth the type, designer, and coupled wheels and cylinder dimensions.

4-4-0. Adams. 6 ft. 7 in. 18 in. × 24 in.
Class I.
1880. Nos. 0135—0146.
1884. Nos. 0147, 0460—0478.
1887. No. 0526.

4-4-0. Adams. 7 ft. 1 in. 18 in. × 24 in.
Class I.
1883. Nos. 0445—0456.

0-4-2. Adams. 6 ft. 1 in. 18 in. × 26 in.
Class J.
1887-8. Nos. 527—556.
1892-5. Nos. 597—656.

4-4-0. Adams. 7 ft. 1 in. 19 in. × 26 in.
Class I.
1890-2. Nos. 577—596.
1895. Nos. 677—686.

4-4-0. Adams. 6 ft. 7 in. 19 in. × 26 in.
Class I.
1892-3. Nos. 557—576.
1895. Nos. 657—666.

4-2-2-0. Drummond. 6 ft. 7 in. 16½ in. × 26. in. (4) *Class I.*
1897. No. 720.
Rebuilt with larger boiler 1905, and cylinders reduced to 14 in. × 26 in.

4-4-0. Drummond 6 ft. 7 in. 18½ in. × 26 in.
Class H.
1898-9. Nos. 280—299.
1899. Nos. 113—122, 702—719, 721—732, 773 (now 733).
Many now superheated and all originally fitted with water tubes have had them removed.

4-4-0. Drummond. 6 ft. 7 in. 19 in. × 26 in.
Class H.
1900-1. Nos. 300—5, 307, 310—314, 336—8.

4-4-0. Drummond. 6 ft. 19 in. × 26 in.
Class E.
1903-4. Nos. 395—404.

4-4-0. Drummond. 6 ft. 7 in. 19 in. × 26 in.
Class D.
1904. Nos. 415—434.
All engines of "300," "395," and "415" classes now superheated and Drummond water-tubes removed. Many now have six-wheeled tenders. "395" and "415" classes fitted with large boilers, as are all subsequent classes except the "340's," and "369's."

4-4-0. Drummond. 5 ft. 7 in. 18½ in. × 26 in.
Class F.
1900-11. Nos. 134—176, 186, 340—345, 347, 358, 380—394, 405—414, 435—442.

4-2-2-0. Drummond. 6 ft. 7 in. 14 in. × 26 in. (4). *Class I.*
1905. Nos. 369—373.

4-6-0. Drummond. 6 ft. 16 in. × 24 in. (originally 4). *Class A.*
1905. Nos. 330—334.
Engines of this class have been rebuilt twice. by Mr. Urie in 1921, and by Mr. Maunsell in 1925. They now have two cylinders in place of the original four.

4-6-0. Drummond. 6 ft. 16½ in. × 26 in. (4).
Class A.
1906. No. 335.
Rebuilt as two 21 in. × 28 in. cylinder engines in 1921, by Mr. Urie.

4-6-0. Drummond. 6 ft. 15 in. × 26 in. (4).
1908. Nos. 453—457.
1911. Nos. 448—452.
Now replaced by engines of "King Arthur" class. Original No. 449 is now running as 0449.

4-6-0. Drummond. 6 ft. 7 in. 15 in. × 26 in. (4). *Class B.*
1911. Nos. 443—447, 458—462.
Superheated by Mr. Urie.

4-4-0. Drummond. 6 ft. 7 in. 20 in. × 26 in.
Class D.
1911. Nos. 463—472.
Superheated by Mr. Urie.

4-6-0. Urie. 6 ft. 21 in. × 28 in. *Class A.*
1913. Nos. 482—491.

4-6-0. Urie. 6 ft. 7 in. 21 in. × 28 in.
Class A.
1919. No. 736—755.
Now being named and classed as "King Arthurs."

4-6-0. Urie. 5 ft. 7 in. 21 in. × 28 in.
Class A.
1919. Nos. 496—515.

4-6-0. Urie. 6 ft. 21 in. × 28 in. *Class A.*
1924. Nos. 473—478. 521—524.

4-6-0. Maunsell. 6 ft. 7 in. 20½ in. × 28 in.
Class A.
1925. Nos, 448—457, 763—792.
These engines together with above mentioned "736" class constitute the "King Arthur" series. Engines 448—457 are replacements of Drummond "453" type, above. 763—792 built by North British Locomotive Company.

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Railways and the Strike.

"OWING to circumstances beyond our control," in that the recent general strike included the printing trades as well as railway and transport workers and others, this issue of THE RAILWAY MAGAZINE is necessarily published later than usual. It is, however, a complete number, including all usual features, so that the only indulgence we ask of our readers is in regard to delayed publication.

There is no need for us to review the strike occurrences in that most of its episodes were made known in the makeshift newspapers and other publications of the period, and through the agency of the British Broadcasting Company, while for a complete record of its various stages, official statements, &c., we may refer our readers to the May 7-14 issue of our contemporary *The Railway Gazette*. The result showed the futility of a general strike, in that in endeavouring to inconvenience particular industries the strikers not only jeopardised the well-being of the community as a whole but also found that the results reacted upon themselves. In self-defence the nation organised itself against the various sections of the strikers, volunteer and other agencies responded to the call to a degree which very soon made it quite clear that the strike could not succeed in its objects, and as a result trade unionism has received the most severe setback it has ever experienced. The railway trade unions, in which we are principally interested, have done good work in the past and should do more good work in the future. But they must keep to their legitimate field, that of safeguarding the interests of their members, acting through proper channels, recognising also that railway operation is governed by economic considerations.

A special feature of the strike situation was the extent to which the railways increased their services from day to day with a nucleus of loyal workers, arduous work on the part of headquarters and divisional officers, clerks and others, and the splendid service of many hundreds of volunteers. Electric routes were very well served indeed, but the steam-operated lines did quite as well, bearing in mind the greater complexity of the working generally involved, the need for at least partially skilled enginemen, and the fact that signal-box control applied to a greater extent than on some, if not all, of the electric routes. People of all ranks rendered assistance, on menial as well as more dignified duties.

Volunteer labour was throughout very plentiful, and, although there was in many cases a demand greater than the supply for enginemen and signalmen, large numbers of the offers of assistance could not be utilised. An interesting feature is that on several lines the services of students from engineering colleges and other institutions were recruited, their technical knowledge enabling them to adapt themselves to their new duties rapidly and readily. It may be said, indeed, that had it not been for the fact that to extend railway services to any great extent would have involved many of the complications of standard railway working (whereas the policy was consistently adhered to of keeping to simplified operation), many more trains could have been run. As it was, as the volunteers became more and more familiar with the work, it was found possible to add very considerably to the numbers of passenger trains run and gradually to increase to a substantial degree the numbers of goods trains operated.

With these general notes it will be sufficient to give a table showing the numbers of trains run daily.—

NUMBERS OF TRAINS RUN.

	L.M.S.R.	L.N.E.R.	G.W.R.	S.R.
May 4 ..	—	148	194	174
,, 5 ..	446	305	250	334
,, 6 ..	672	578	300	515
,, 7 ..	814	703	479	753
,, 8 ..	916	760	500	822
,, 9 ..	975	*	520	264
,, 10 ..	1,227	977	908	1,069
,, 11 ..	1,347	1,154	1,025	1,276
,, 12 ..	1,732	1,245	1,297	1,510
,, 13 ..	1,740	1,324	1,385	1,559
,, 14 ..	1,865	1,363	1,517	1,620

* No passenger trains run, but a number for conveying goods, milk, fish, &c.

The Metropolitan Railway ran quite a creditable service on the first day and rapidly increased, as shown by the following total numbers of trains for the days stated: May 4, 235; May 5, 379; May 6,

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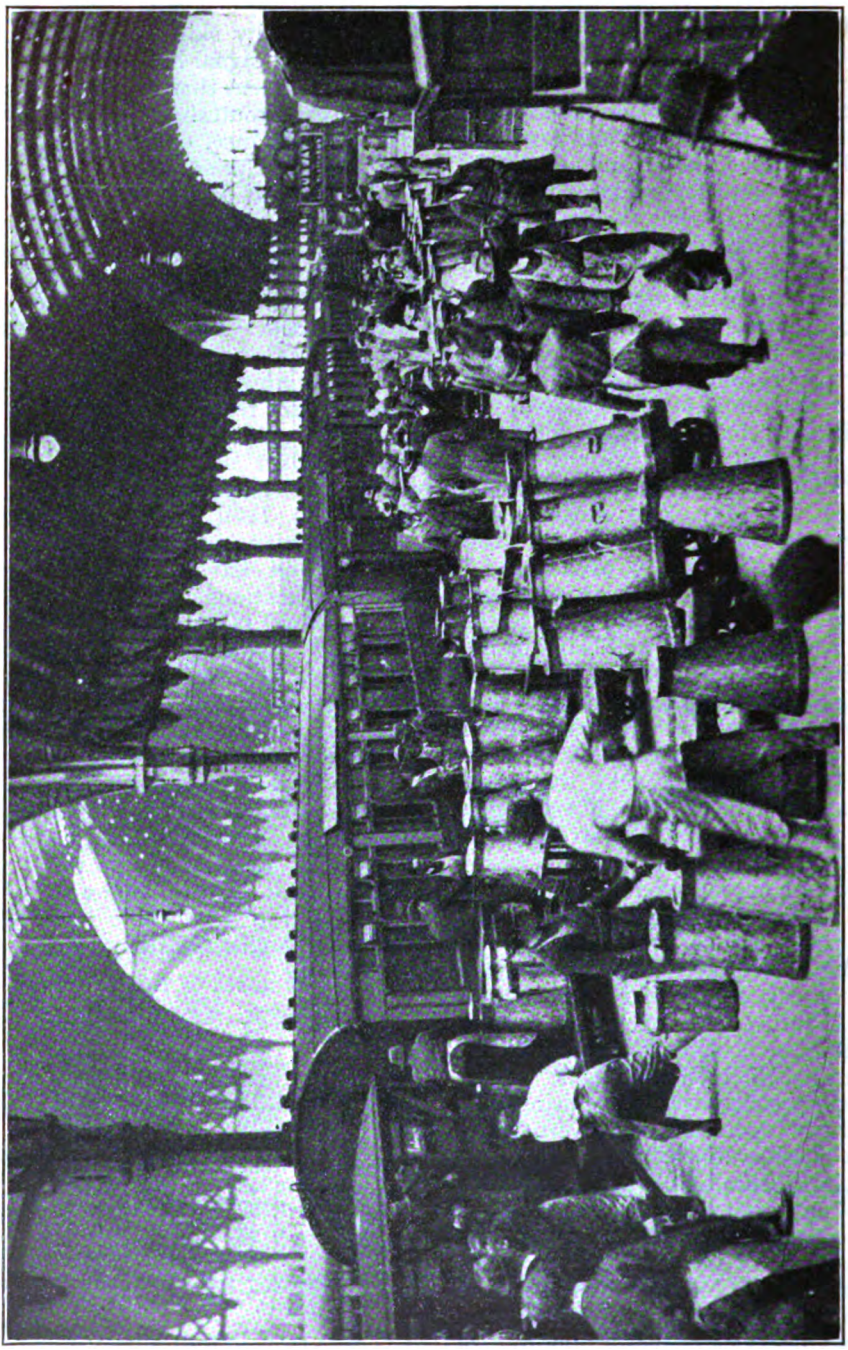

Photo.] HANDLING MILK TRAFFIC AT PADDINGTON, G.W.R. [Topical.

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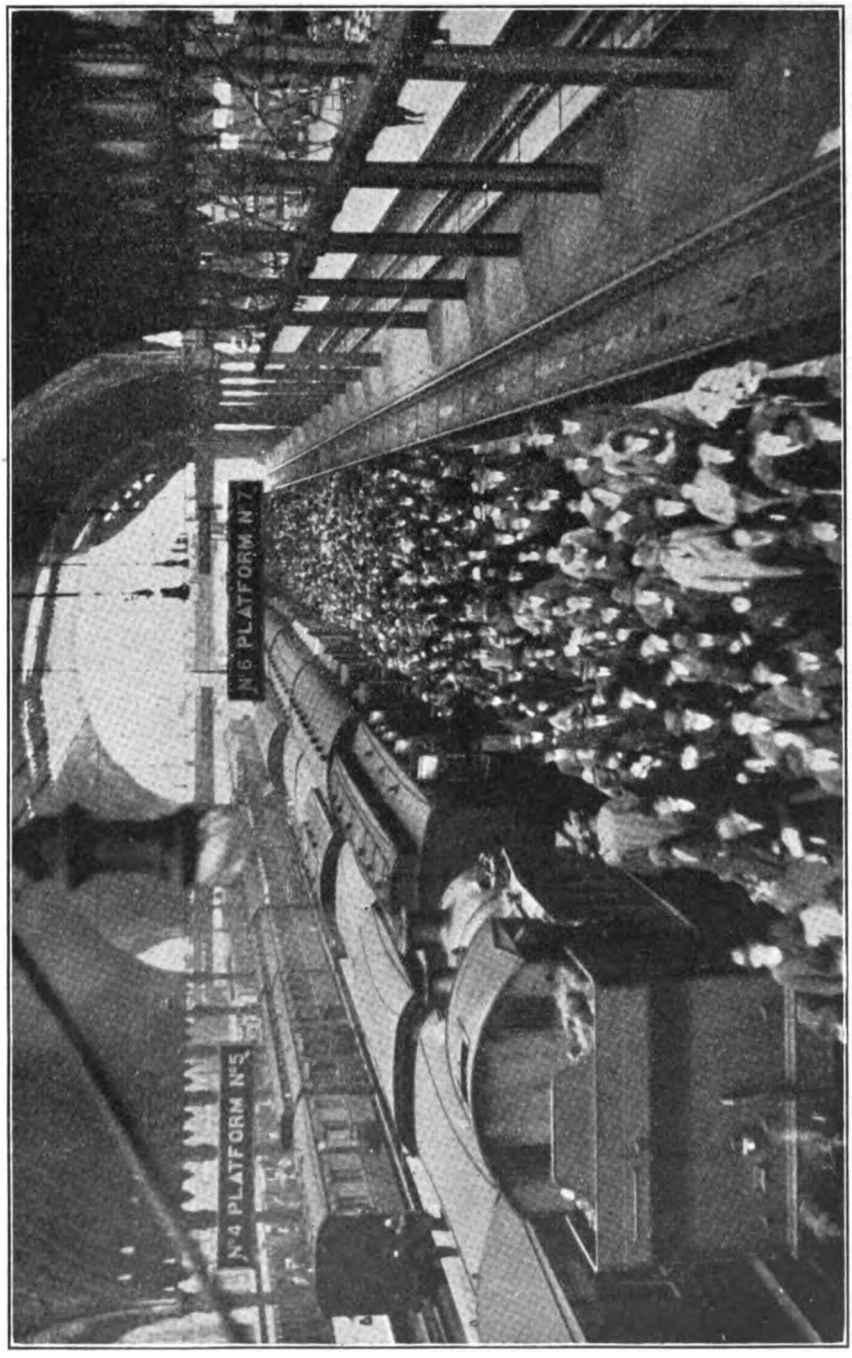

Photo.] A FULL TRAIN LOAD AT PADDINGTON ON THE SECOND DAY OF THE STRIKE. [*Topical.*

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Photo.] [*Topical.*

MR. JAMES PAGE, LATE STATIONMASTER, PADDINGTON, AS A VOLUNTEER GUARD ON THE BARNSTAPLE BRANCH, G.W.R.

Photo.] [*Photopress.*

LORD MONKSWELL AS SIGNALMAN, MARYLEBONE STATION, L.N.E.R.

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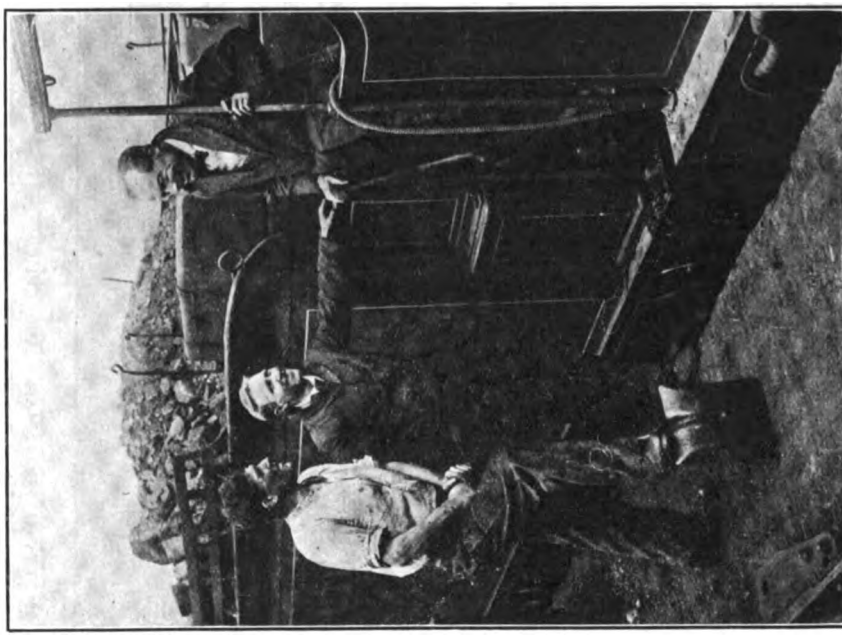

Photo.] [*Photopress.*

VOLUNTEER ENGINEMEN ENJOYING A JOKE.

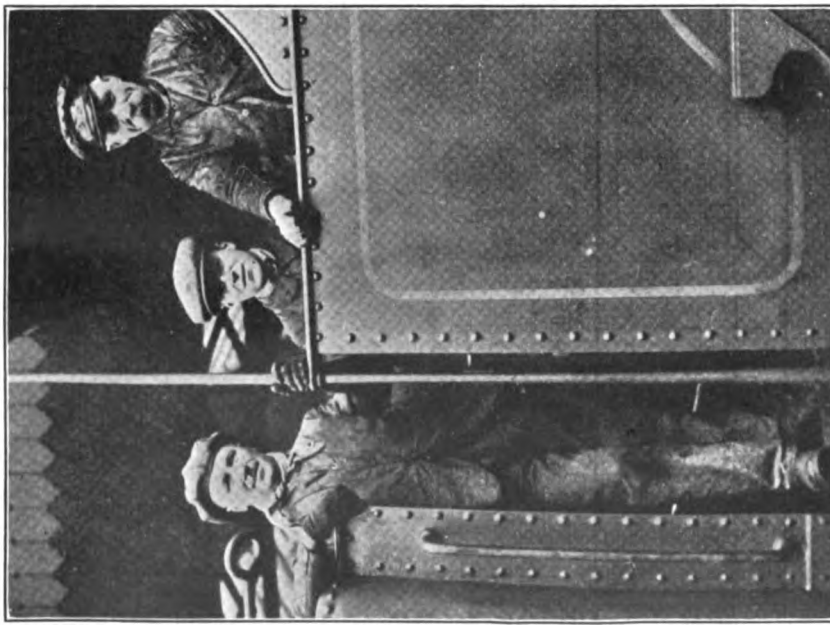

Photo.] [*Topical.*

MR. H. F. R. FRANKLIN (DIRECTOR OF BASSETT-LOWKE LIMITED) AND HIS SON AS FIREMEN, L.M.S.R.

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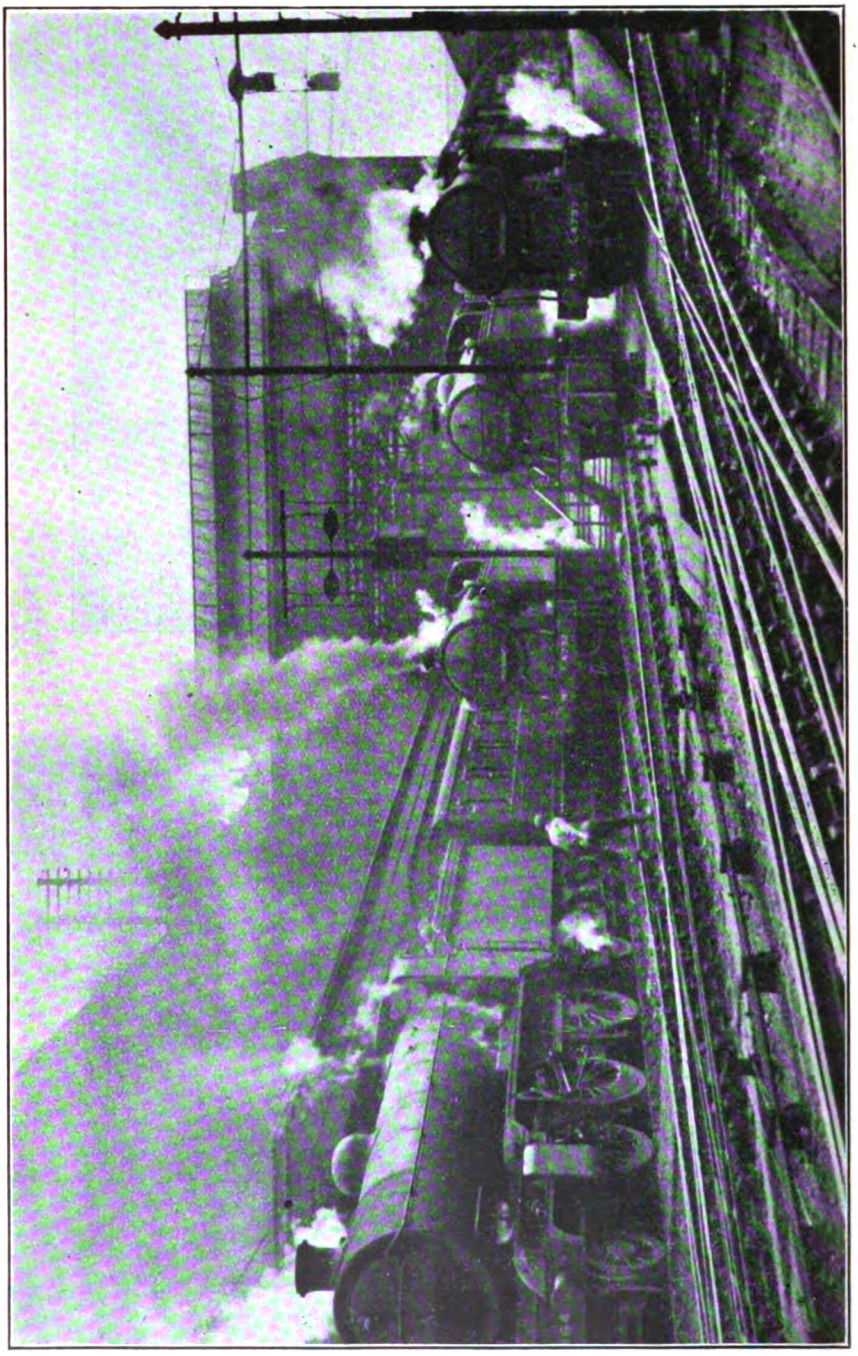

Photo.] TRAINS READY TO LEAVE KING'S CROSS. "FLYING SCOTSMAN" ON LEFT. [*Topical.*

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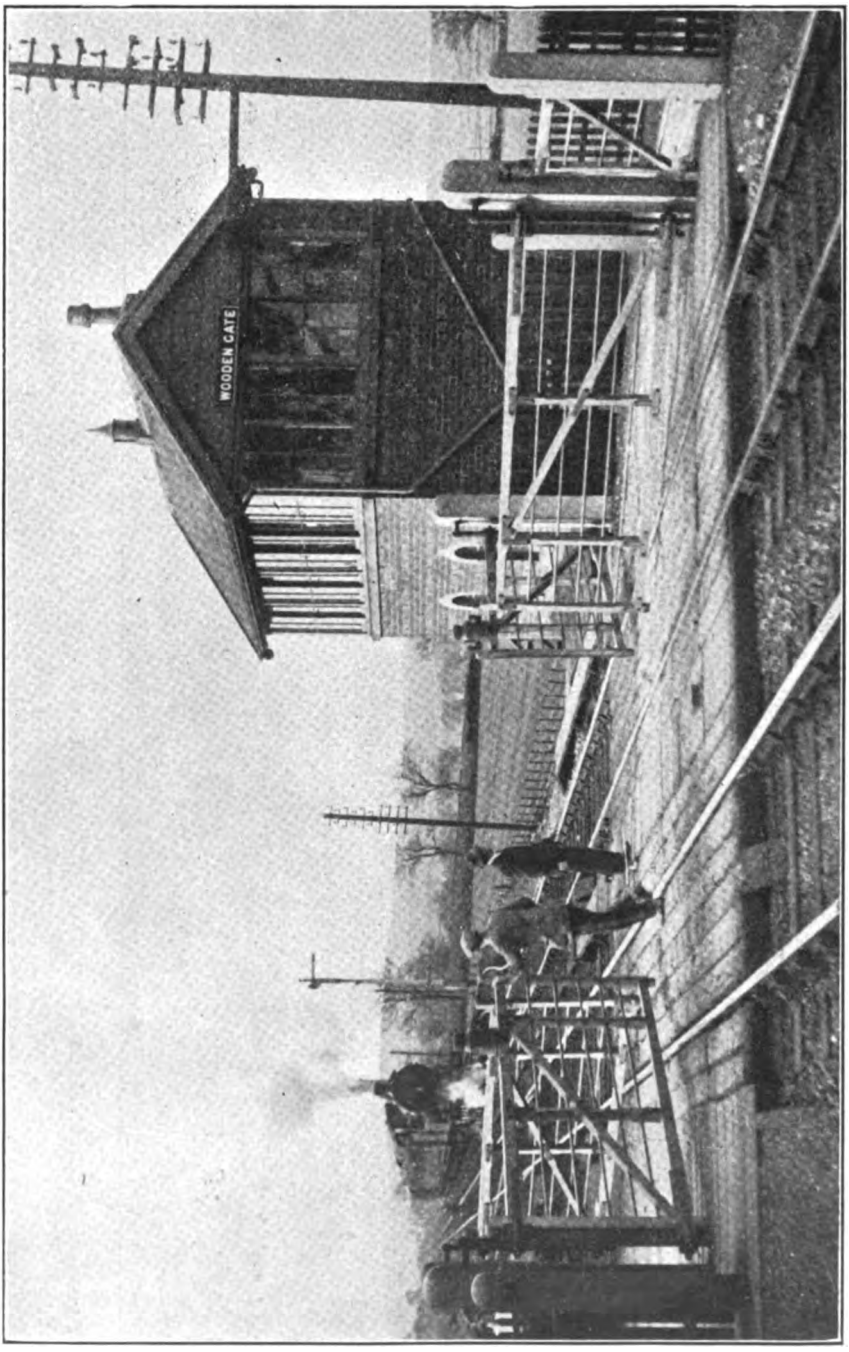

Photo.] TRAIN CREWS OPENING LEVEL-CROSSING GATES, L.N.E.R. MAIN LINE. [*Topical.*

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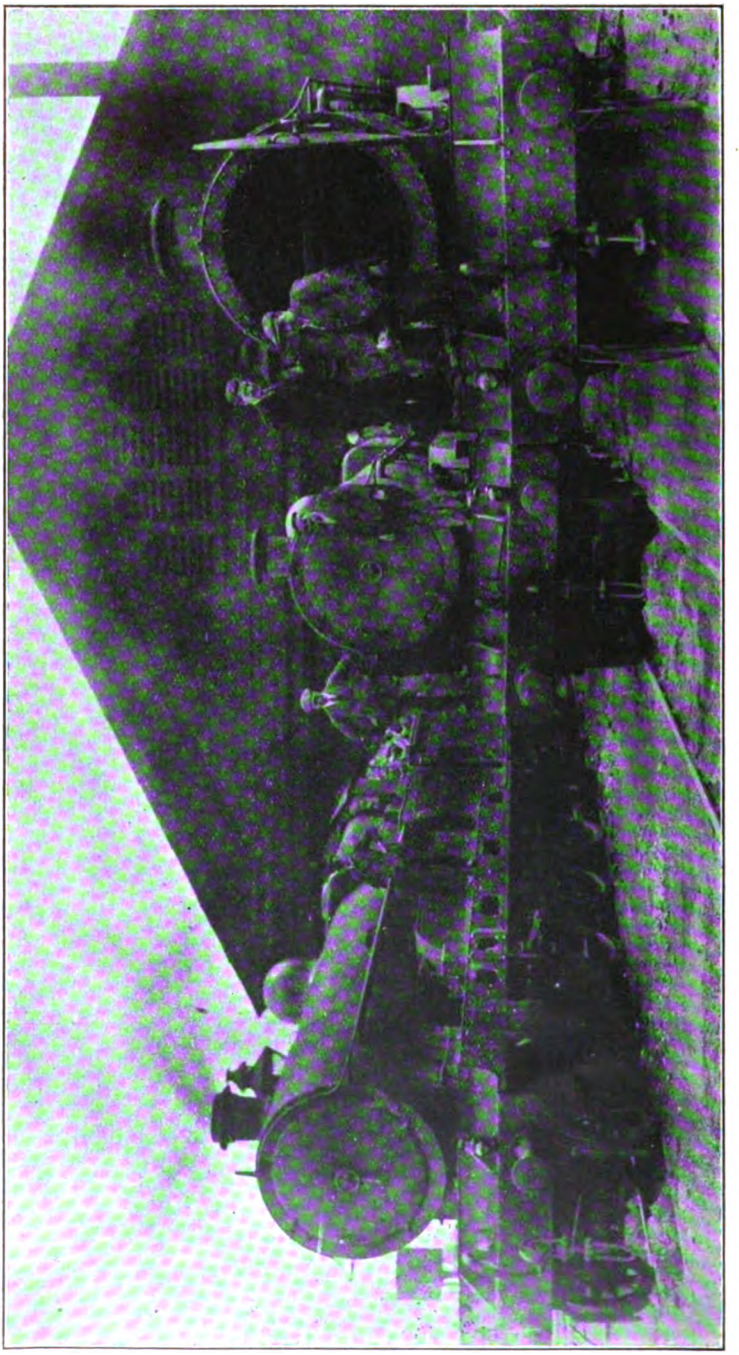

Photo.] VOLUNTEERS PREPARING ENGINES FOR DUTY AT CAMDEN LOCOMOTIVE DEPOT, L.M.S.R. [*Topical.*

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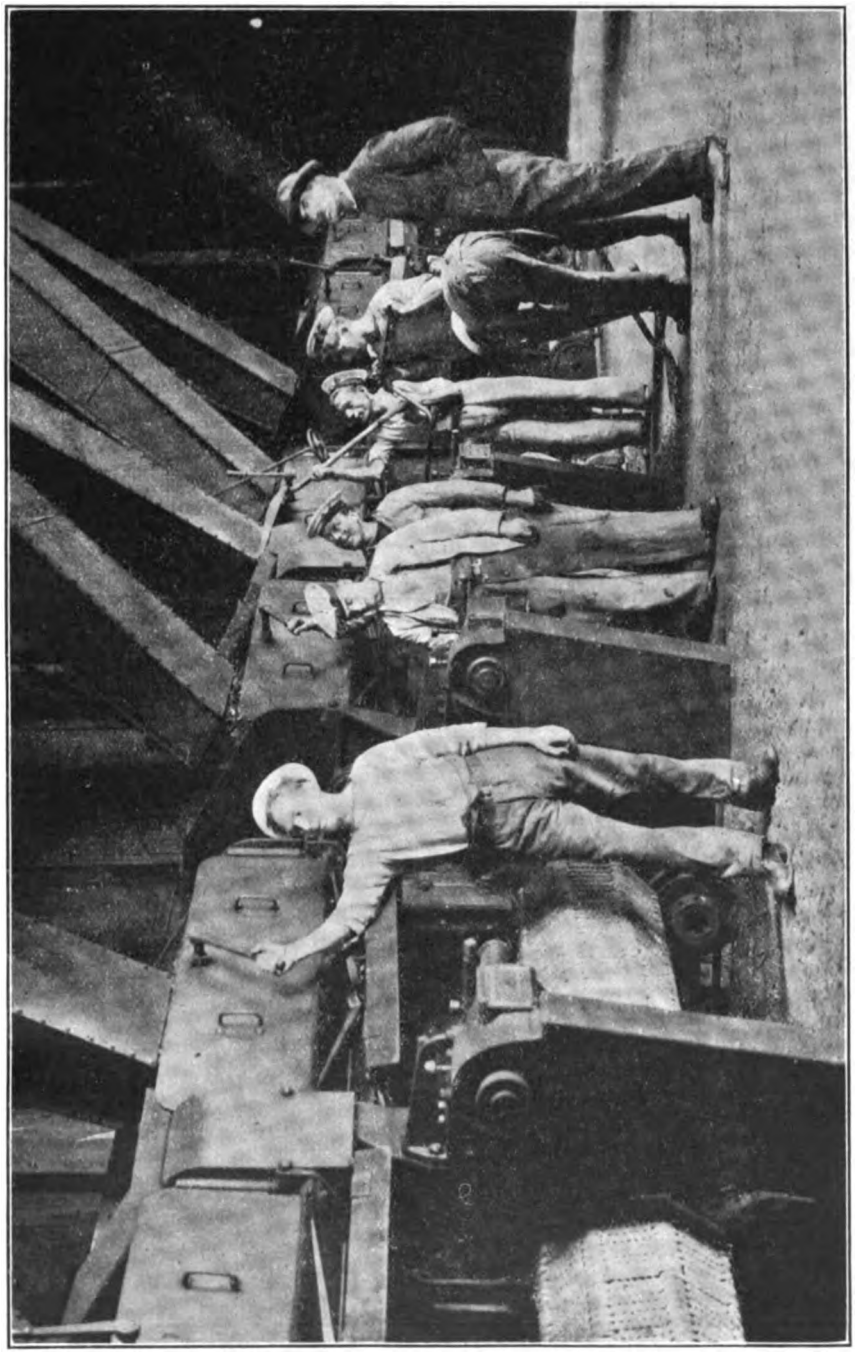

NAVAL STAFF IN BOILER HOUSE, NEASDEN POWER STATION, METROPOLITAN RAILWAY.

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VOLUNTEER ENGINEMEN AT KING'S CROSS, L.N.E.R.

Photos.] VOLUNTEERS CLEARING POINTS AT KING'S CROSS, L.N.E.R. [*Topical.*

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435; May 7, 488; May 8, 495; May 10, 565. Following days witnessed still further additions. Corresponding figures are not available in the case of the "Underground" group, while they would be difficult to compare, as not only were additional sections added from day to day, but further stations were brought into use, until by the end of the first week there were but few sections without trains.

STEAMER SERVICES.

Calais-Dover	At least one service every day.
Dover-Ostend	One service (or more) daily from May 6.
Folkestone-Flushing ..	One service (or more) daily from May 6.
Southampton-Havre ..	From May 7.
Southampton-St. Malo ..	From May 6.
Southampton-Channel Islands	From May 7.
Weymouth-Channel Islands	From May 7.
Holyhead-Kingstown ..	From May 7. Alternate days.
Harwich-Hook of Holland	May 8. Return May 10.
Fleetwood-Belfast ..	May 6. Alternate days.
Newhaven-Dieppe ..	From May 6.
Larne-Stranraer	From May 11. Alternate days.
Wemyss Bay-Arran ..	From May 10. Alternate days.

One of the features of the Great Western Railway was their ability, not only to deal with the normal ocean passenger and mails business through Plymouth, but to handle additional calls and landings diverted into that port. Twenty boats called to land 3,000 passengers and seven special trains were run to London. In other cases the two trains regularly run at 9.25 a.m. and 12.30 p.m. to Paddington were used.

When the strike broke out the dock lines were badly congested with goods wagons, but volunteer labour was eventually able to clear the running lines to enable the boat passengers to entrain alongside the docks waiting rooms as usual for the direct run thence to Paddington. In addition to the inwards traffic three embarkations were arranged, including a special call of the P. & O. Company's *Kaisar-i-Hind*, for which a restaurant-car special was run from Paddington.

BELFAST-DUBLIN BREAKFAST-CAR EXPRESS, G.N.R.(I).

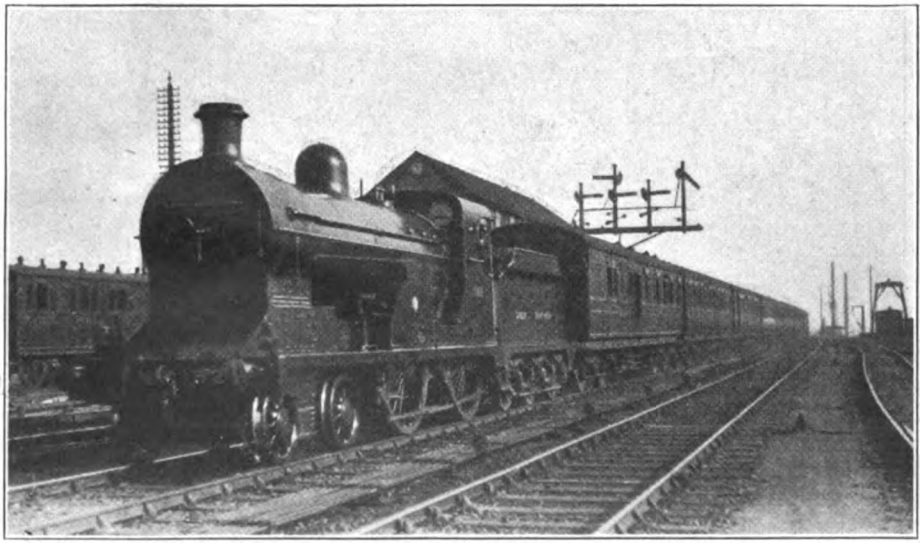

Photo.] [*W. H. C. Kelland.*

APPROACHING AMIENS STREET STATION, DUBLIN. 4-4-0 SUPERHEATER LOCOMOTIVE No. 192.

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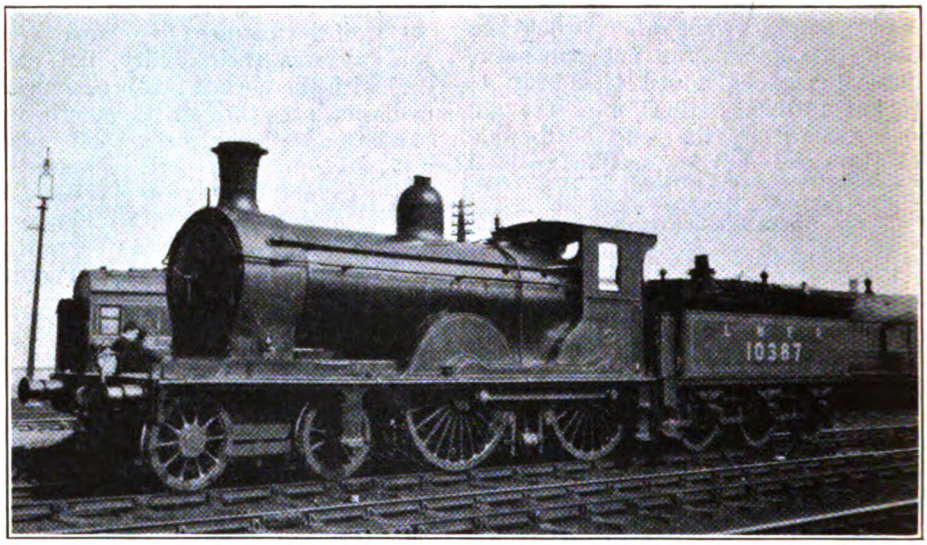
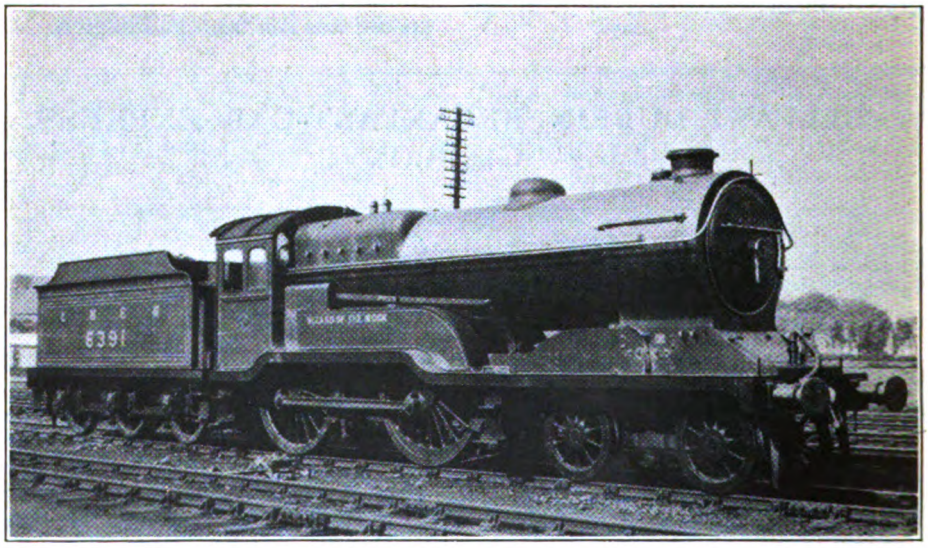
OLD AND NEW ON THE L.N.E.R.





We are indebted to Mr. R. D. Stephen, writing from Inverkeithing, for the two photographs reproduced, of interest in that they represent almost the extremes of present-day locomotive practice on the North British section of the L.N.E.R. The first shows a Drummond 4-4-0 No. 10387, rebuilt with Holmes cab, &c., and painted in L.N.E.R. livery, and as working from Haymarket shed, Edinburgh. Previous numbers were 491 and 1387. This engine is believed to be the last of its class, No. 10361 having been withdrawn, it is understood, last summer.

The second illustration shows one of the latest "Director" class 4-4-0's, No. 6391, *Wizard of the Moor*, with raised running plate.

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RAILWAY MAGAZINE readers desiring information should mark envelopes "Query" in the upper left-hand corner, and address them to the Editor. Questions relating to the dimensions and weights of railway rolling-stock and to names, numbers, dates, etc., of locomotives should not be forwarded. Applications for information concerning "British Locomotive Practice and Performance" may be addressed to Mr. Cecil J. Allen, c/o RAILWAY MAGAZINE, 33, Tothill Street, Westminster, London, S.W.1. No reader should send more than two questions in one month. Correspondents are requested to write on one side of the paper only, and although they must give their names and addresses, pen-names or initials may be inserted for Editorial use. Before asking for information concerning railway history or "grouping," the pages of the "Railway Year Book" (5s. net) should be consulted. The twenty-eighth Annual Edition (1925) of this standard railway reference work is now published. All previous Editions are out of print.

Locomotive Lists.

We have several times explained that to give detailed particulars of locomotives of even one of the pre-grouping railways, let alone of one of the present grouped companies, would entail far more space than is available in our pages, particularly in view of the fact that, while many series could be set forth collectively, every railway has a proportion of engines which would call for detailed classification, especially if rebuilding, &c., were taken into account. You will note, however, that we are giving, here and there, material of this kind on a sectional basis, and hope, in due course, to be able to meet the wishes of readers in this respect to a certain extent, if not as completely as your own and other requests would demand.

[Reply to "HOCKERILL HALT" AND OTHERS.]

Southern Railway Locomotives.

We have no knowledge that the "770" class of Eastern Section 4-4-0 locomotives have any particular nickname. "Locomotive Matters" has recently included a considerable amount of information as to the "Wainwright" 4-4-0 locomotives. Mr. Allen has several times explained the gradients from Charing Cross to Tonbridge Junction. We have no reason to think it at all likely that S.E. & C. expresses ever reach 90 m.p.h. down Hildenborough Bank. They could probably do it, but the curves render any such performance undesirable. G.W. "Castle" class locomotives are banked between Newton Abbot and Plymouth if the load exceeds about nine bogies.

[Reply to W. G. A. THOMAS.]

Train Services for Private Requirements.

The instance you quote of a train which, before the War, ran from Overton to Basingstoke when required, is an example of the many train services which are to be found here and there, some appearing in the public time-tables, but most shown in the working books only, which are run to meet special requirements. The train in question formerly ran for the conveyance of a road vehicle to provide a connection between a factory at Overton, in order to join up with an early train from Southampton to London. Most instances of this character are capable of some similar explanation.

[Reply to "ALLEYNIAN."]

G.W. Locomotives.

The 2-8-0 mixed-traffic locomotives of the "4700" class are, to some extent, used for secondary and semi-fast main line traffic, though we have heard nothing

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about any of them for some time past. Photographs have, however, been reproduced, though not recently. We know that they have worked such trains and instances have been quoted where they have done noteworthy speed work. There are several classes of the 2-6-2 tank engines, though we cannot go into the classifications of individual numbers. You will bear in mind, also, that there are large and small versions of these engines.

[Reply to W. JONES.]

L.M.S.R. and L.N.E.R. Locomotives.

The L.M.S.R. has for some time had a 2-6-0 design in hand, though the first engine has not yet made its appearance. Messrs. Bassett-Lowke's model presumably corresponds in general appearance. G.N.R. 8-ft. single engine No. 1 was preserved at King's Cross sheds for some years, although not complete in all details and in running order. She was repaired, re-tubed, and re-painted to run under her own steam in the Centenary Procession at Darlington last year, and has since been returned to King's Cross sheds, though it is proposed to place her in the Railway Museum at York.

[Reply to "CLAN STEWART."]

The "Best" Main Line.

Obviously, it is impossible to answer a query such as this, as each of the leading pre-grouping railways had its own standards for permanent way construction the character of which was influenced by the general class and volume of traffic passing thereover, so that the differences were chiefly due to variations in practice, and the question as to which was the best-laid track would be largely a matter of individual opinion. Victoria Station, London, is already worked as one station, though still necessarily in two sections for operating purposes.

[Reply to "THE BEST WAY."]

Train Working at Cromer.

You are right in assuming that, in the up direction, through coaches from Sheringham to Liverpool Street are attached to the main train in Cromer station whereas, in the down direction, they are detached at the junction outside that station. The distance between the station and the junction is very short, and the backing of the through coaches from the junction into Cromer station is permitted. There are, in fact, numerous instances of more or less similar methods, particularly in the North of England.

[Reply to F. STAPLETON.]

Birmingham and Bristol Services, G.W.R.

There would be little object in using 4-6-0 engines on these trains between Birmingham and Cheltenham, seeing that 4-4-0 engines must be employed over the Midland section between Cheltenham and Bristol. Time would be lost in changing engines at Cheltenham, and, in addition, the timing of the trains is such that it would be difficult to work out satisfactory duties for the engines concerned on such short distances as Birmingham–Cheltenham and Cheltenham–Bristol.

[Reply to S. C.]

Disused S.R. Lines.

The lines you have noticed alongside the tracks used by District electric trains between Hammersmith and Gunnersbury belong to the Southern Railway, but have been disused since the War. It is proposed to utilise them by London Electric Railway trains on the "Piccadilly" section, in connection with a scheme of extension beyond Hammersmith. The train you have noticed near Hitchin is probably a stock train, but we have no detailed information.

[Reply to J. B. ASHBY.]

G.W.R. 4-4-0 Locomotives.

The locomotives you mention belong to the "Bulldog" class with 5 ft. 8 in. coupled wheels, 18 in. by 26 in. cylinders, and a boiler pressure of 200 lb. per sq. in. They have done good work in the services on which they have been from time to time employed, but we cannot call to mind whether any have been specially timed or performed any notable speed work, which is, indeed, unlikely, as they were principally intended for "mixed traffic" duties.

[Reply to "BRASENOSE."]

Stephenson Society.

The Hon. Secretary is Mr. J. H. Seaford, "The Nest," Queensway, Gerrard's Cross, Bucks, who will, no doubt, be pleased to supply particulars of membership. No 0-4-2 tender engines are now shown in the L.N.E.R. locomotive stock, though there

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may be a few of the G.N. class on the duplicate list. There are 224 tank engines of the 0-4-4 class and 4 of the 0-4-2 type, but we cannot say how many of these belong to the Great Northern Section.

[Reply to G. EVERETT.]

G.W.R. Boat Train Record Run.

A photograph of the G.W.R. boat train conveying passengers off the s.s. *Mauretania*, leaving Plymouth for Paddington, on September 15, 1924, appeared in THE RAILWAY MAGAZINE for November, 1924. The locomotive concerned was one of the "Castle" class 4-6-0's, but we are unable to give the number. This train left Plymouth at 6.30 p.m. and arrived at Paddington at 10.29 p.m., the distance covered being 227 miles.

[Reply to J. T. S. TUTTON.]

Auto Train Working.

Engines fitted for auto train working have certain connections and mechanism added by which the driver, when located in the driver's compartment of an attached coach, is able to operate the regulator, whistle and brake, and to signal to the fireman. The Kent & East Sussex Light Railway now runs through from Robertsbridge, on the Hastings line, to Headcorn, on the Ashford line of the S.R.

[Reply to G. E. FENTON.]

"Stirling" Singles, G.N.R.

The last of these engines in service was employed about 1907–8, principally on the Lincolnshire lines and on certain routes in the Grantham district, chiefly on light branch and stopping trains. Presumably, it would be in the 'forties, or possibly the early 'fifties, when three-position semaphore signals operating according to the methods of early days were abandoned.

[Reply to "EIGHT FOOTER."]

Line-side Obelisks near London.

We have not the precise facts by us at the moment, but we believe the line-side obelisk to which you refer, between Hatfield and Potter's Bar, is one of several which were erected in earlier days, on lines running into London, in connection with the carriage of coal into the Metropolis, to mark the boundary of the London area.

[Reply to "HERTS READER."]

"Atlantic" No. 3279, L.N.E.R. (G.N. Section.

This engine, originally one of the Ivatt 2-cylinder "Atlantics," was fitted experimentally by Mr. Ivatt some years ago with four simple cylinders, in place of the two, and Walschaert valve-motion, and is still running in this condition. It may be seen frequently on the Leeds-Pullman service.

[Reply to "INTERESTED."]

The Penzance "Postal."

We are aware that an hour has recently been cut from the timing of this train, which now starts at 10.10 instead of 9.5 p.m., but even with this acceleration its speed falls considerably short of that of the day trains on this route, and therefore does not merit any special attention in these columns.

[Reply to "ENQUIRER."]

Photographs of Locomotives.

We are always interested to see the engine and train photographs of readers, whether of British or Continental subjects, provided they are suitable for reproduction, but there are, of course, limits to the number which we can find space to publish, especially in the case of Continental photographs.

[Reply to JOHN H. HAYES.]

Cardiff Railway.

A description of this railway was included in an article entitled "Cardiff: its City, its Railways and Commerce," published in the March, 1907, number of THE RAILWAY MAGAZINE, while an article appeared also in the April, 1911, issue. Both these numbers are, however, now out of print.

[Reply to P. F. ROBERTS and A. G. CARE.]

Concrete Posts on Tonbridge-Hastings Line.

We have no precise information concerning the posts with numbers that have recently been erected, but we imagine they record the position and number of the under bridges (including culverts, &c.), which would account for the irregular spacing to which you refer.

[Reply to F. A. G.]

Great Central Locomotive Chimneys.

We cannot go into details as to which patterns of chimney and dome were fitted to individual engines, but we suggest that

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you study the photographs of the original "class" engines. We are unable to estimate the usual speeds of trains passing Wilford Brick Sidings, Nottingham.

[Reply to E.P.]

S.R.(L.B.S.C.) 4-4-0 Locomotives.

Locomotives known as "Grasshoppers" on the Brighton section, S.R., are class B2X 4-4-0's Nos. 171, 201 to 213 and 314 to 324 constructed at Brighton during the years 1895-8. All of the class have since been rebuilt with larger boilers between the years 1908 and 1916.

[Reply to "STANDARDISER"]

L.N.E.R. "Pacifics" and Skegness.

We are not aware that the "Pacifics" are prohibited from running between Peterborough and Skegness, but in any case the loads and timings on this section hardly call for the employment of such powerful engines.

[Reply to "HERTS READER."]

L.M.S. Express Locomotives.

It is unlikely that any further engines will be built of either the "Claughton" or Horwich-built 4-cylinder 4-6-0 types for this railway, in view of the larger express type now in course of construction.

[Reply to G. A. C. JONES.]

L.N.E.R. (G.E.) Engines at Windsor.

We have no precise information as to why you saw a Great Eastern 4-4-0 at Windsor on the day you mention, but it was probably in connection with a journey of Royalty through from Sandringham to Windsor Castle.

[Reply to S. C. S.]

Tractive Efforts of L.M.S. Engines.

At 85 per cent. working pressure, tractive efforts of Western Division express engines L.M.S., are as follows:—"Claughton" type, 25,155 lb.; "Prince of Wales" type, 22,190 lb.; "George the Fifth" type, 20,640 lb.

[Reply to P. B.]

French Railway Stations.

The best source of information as to French stations and distances is the *Indicateur Chaix*, which may, we believe, be purchased at Hachette's bookshop in London. It corresponds to our English "Bradshaw."

[Reply to "CAERPHILLY CASTLE."]

"Pop" Safety Valves.

There is nothing peculiar in the fact that any particular engine has been fitted with Ross "pop" safety valves, in that detail changes of this kind are frequently being made when engines are rebuilt or reboilered.

[Reply to V. W. WING.]

S.R. 2-4-2 Tank Engine.

The 2-4-2 tank engine included in the list given in the Southern Railway official report is the Baldwin locomotive working on the Lynton and Barnstaple line now taken over by the Southern Railway

[Further reply to A. H. HASTIE.]

Long Platforms.

We have not by us the exact length of the long island platform at Pontypool Road, G.W.R., but it is less than ¼ mile, and falls considerably short of the examples mentioned in the March issue.

[Reply to LIEUT. S. H. MACKILLOP.]

Improvements at Dover, S.R.

General particulars of the alterations at Dover have been published. We understand that work is to be commenced very shortly and the initial stages are probably already in hand.

[Reply to "DOVERIAN."]

12.5 p.m. ex Paddington.

Engine of the summer Ilfracombe express is changed at Taunton, the large express engines not being permitted to work over the branch from Taunton to Barnstaple.

[Reply to "TORTWORTH COURT."]

Kilometre Posts, C. de F. du Nord.

Main lines of the French Nord are marked out in kilometres and tenths; we believe the posts are generally fixed on the *down* side of the line, reckoned from Paris.

[Reply to "DESCRIPTIVE."]

Allan Singles, L.N.W.R.

This class disappeared from service many years ago, but the first of the class, incidentally the first engine constructed at Crewe Works, is still preserved there.

[Reply to F. W. ADNITT.]

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4-6-0 No. 8509, L.N.E.R. (G.E. Section).

Your query is far from explicit, but it may refer to the tube-cleaning apparatus with which a number of the 4-6-0 express engines on this section are now fitted.

[Reply to R. C. PRATT.]

"Mid-day" Scotch Expresses.

This title is usually applied to the 1.15 p.m. from King's Cross and 1.30 p.m. from Euston, with their corresponding return workings.

[Reply to W. T. THORNEWELL.]

Conishead Priory Branch, Furness Railway.

Prior to the Great War one passenger train in each direction was run on week-days between Ulveston and Conishead Priory station.

[Reply to R. HALKETT JUNR.]

Piloting.

It is the train engine that is liable to suffer chiefly as a result of piloting, owing to the grit and so on thrown up into its motion by the leading engine.

[Reply to C. K. DOUGLAS.]

L.N.E. (Great Eastern) Loco. Performance.

Mr. Cecil J. Allen hopes to include some Great Eastern runs in his monthly articles during the course of the present year.

[Reply to H. S. C. EVERARD.]

Leek and Manifold Railway.

This railway was described in the April, 1917, number, now out of print. The gauge of the line is 2 ft. 6 in.

[Reply to P. F. ROBERTS and A. G. CARE.]

G.N. Rail Motors.

You must be a little more specific as to the information required ere we can answer the query.

[Reply to J. GAVIN BROWN.]

Midland Compound 4-4-0's.

No. 1000, pioneer of this type, was long since fitted with superheating equipment.

[Reply to "CAERPHILLY CASTLE."]

RAILWAY LITERATURE.

LOCOMOTIVE SUPERHEATING AND FEED-WATER HEATING. The Locomotive Publishing Company, 3, Amen Corner, London, E.C.4. Price 5s.

This forms a supplement to *The Locomotive, Railway Carriage and Wagon Review.* The 142 pages of this volume contain a wide survey of the important subjects incorporated in the title, commencing with a study of the theory of superheated steam, the economics of superheating, and a brief history of the superheater locomotive, passing on from this to a consideration in detail of the practical design and construction of locomotive superheating and feed-water heating apparatus. The volume is copiously illustrated by means of detailed drawings, photographic reproductions, &c., the latter showing a variety of home and foreign locomotives equipped with superheating and feed-water heating devices. In view of the importance of the subject and the widespread interest shown in it by locomotive engineers in all parts of the world, the supplement should find a ready demand.

Drawings are in all cases clearly reproduced, as is also the text. The same applies to the majority of the half-tone reproductions although a few of these latter, particularly those illustrating Continental locomotives, leave something to be desired. Some of the diagrammatic illustrations have been reproduced in colours, which greatly facilitates the representation of the different parts of the locomotive and the apparatus with which it is fitted, and this should be a particularly useful feature to students of the locomotive and others who wish to acquaint themselves with the method of application and working of the different features referred to.

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KENT AND EAST SUSSEX RAILWAY.

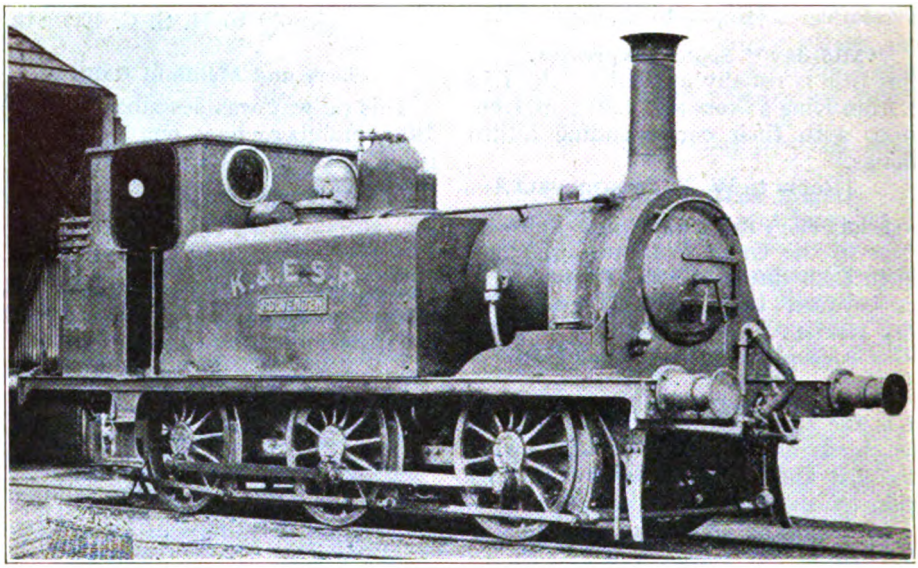

Photo.] STROUDLEY TANK ENGINE No. 5, "ROLVENDEN." [*O. J. Morris.*

THIS engine was the first of Mr. Stroudley's famous Brighton Railway "Terriers," and is probably the oldest engine still running south of London. It came from Brighton Works in October, 1872, and was named *Wapping*. Although the "A" class were designed primarily for working the South London Line, the first batch of six were sent to work the East London Line between New Cross and Wapping, and were given names corresponding to the route. The East London Line (upon which an article by Mr. H. L. Hopwood appeared in THE RAILWAY MAGAZINE for April, 1919) was, at the time of this engine's completion, worked by two of Mr. Craven's tank engines. At the head of the article referred to will be found a photographic reproduction of engine No. 71 *Wapping*, as originally built; on comparing it with that reproduced above few changes will be apparent. Amongst these may be mentioned the following: vacuum brake (on the L.B.S.C. this engine was latterly fitted with the Westinghouise: the original photograph shows the engrne with hand-brake only); new cylinder lubricator taps (fitted by the K. and E.S.R.); absence of exhaust pipe from smokebox to tanks (removed by Mr. R. J. Billinton some 25 years ago), and also of the copper circulating pipe across the tanks, which in the earlier photograph will be seen near the cab. This pipe was to allow the steam from the exhaust to circulate through the tanks, but, the water also getting through it, it was at a later date removed. Lastly, it will be observed that coal rails have been fitted round the bunker top by the new owners.

In 1901 No. 71 was renumbered 671, and in February, 1905, it was sold to the Kent and East Sussex Railway, where it is still at work after more than half-a-century of existence. No. 3, *Bodium*, on the same line was L.B.S.C. No. 70, *Poplar*, built one month later than the locomotive under notice, and also employed on the East London Line.

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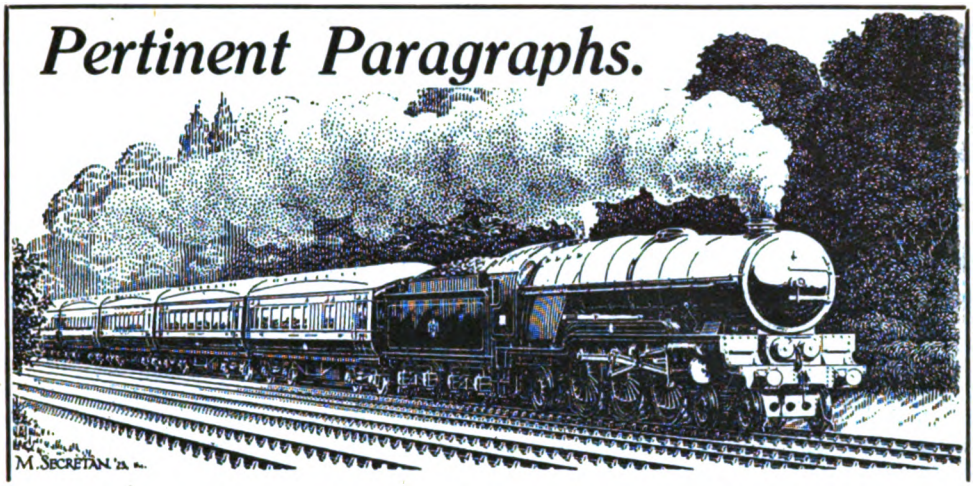
Pertinent Paragraphs.



Why Not Third-Class Sleeping Cars on British Railways?

A CHELTENHAM correspondent raises again the old question as to why British railways do not provide sleeping-car accommodation for third-class passengers. This is a matter which has often been referred to in the general press, and the question is not altogether easy to answer, as to appreciate the reason why, so far, first-class passengers only are thus privileged, one has to take into account not only the special features of British long-distance main-line traffic, but also the volume thereof. It is true that in other countries provision is made in this respect for other than first-class passengers, allowing for the second class abroad being the practical correspondent to our third class. It will nearly always be found, however, that the services which include such accommodation are of a special character, or that all demands can be met by one or two night services only, and that, even then, the trains are not rendered unduly heavy or do not require duplication. In countries such as the United States and Canada, where very long journeys are the rule, it will generally be found that most of the sleeping-car trains involve supplements upon the ordinary standard fares, which, with the provision of parlour and drawing-room cars, &c., helps to produce what may be described as first-class travel conditions. The fact that the journeys are so long and must inevitably take more than 24 hours entails that provision has also had to be made for tourist and colonist cars, with sleeping accommodation, though, even then, the conditions are vastly different from those which apply to our own main lines, where there are from 12 to 20 night trains which might legitimately be regarded as justifying third-class sleeping accommodation, beside which most of the trains in question are very popular ones and usually heavy, under present conditions. Many proposals have been made for types of vehicles which would accommodate a fair number of persons without unduly increasing the space occupied as compared with the compartment provision, and we should never be surprised to find something of the kind introduced. There are, however, sound economic reasons for maintaining present methods in default of a really satisfactory solution of the problem on behalf of third-class passengers.

Second-Class Sleeping Cars Abroad.

OUR correspondent, after arguing the point on the lines indicated by our comments, gives particulars of arrangements in other countries, which may be quoted as follows :—

"In India, first, second and intermediate classes are so arranged that, at night, the passengers occupying the compartment may readily convert their seats into sleeping berths at their own option, and as every one in India who travels carries his own bedding, this presents no special difficulty. It is the custom of the country. In Malaya, the F.M.S. Railways have seats so arranged that, by pulling out the sliding bottoms, they may be quickly converted into sleeping berths, and bedding is provided by the railway at a small charge per passenger. In West Australia, sleeping cars are attached to the night trains travelling long distances, and the second-class passenger may, by the extra payment of only 6s., get a night's rest by transferring to the sleeper. Each second-class compartment accommodates six sleeping berths, arranged by swinging up the backs of the seats, three in a tier. The accommodation is decidedly cramped, but when once the passenger has got aboard his berth he can at least sleep comfortably. He

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is provided with a pillow and two warm blankets. These sleepers are much appreciated by emigrants and farmers. On the trans-continental both first and second-class sleepers are provided, the first having four berths and the second six. Between Adelaide and Melbourne only first-class sleeping berths are provided. The same applies to the line between Melbourne and Sydney, where an extra charge of 17s. 6d. is made on top of a first-class fare. In this respect the States of Victoria and New South Wales are following the conservative methods of Great Britain, but in Westralia and Queensland more democratic ideas obtain. In New Zealand, night trains are only run in the North Island, and sleepers are provided for first-class passengers between Auckland and Wellington. The latest type of sleeping car has been shown at the Dunedin Exhibition, which will shortly close, and in this the cabins are fitted with two berths only and the appointments are as luxurious as anyone could wish."

Accommodation for Non-Sleeper Passengers.

"For the first or second-class passenger not desiring a sleeping berth, cushions are provided and rugs, which may be hired at certain stations, and, as the seats are adjustable, a certain amount of rest can be obtained in a more or less sitting posture. In South Africa the sleeping accommodation in the long-distance trains is divided into two and four-berthed compartments, with an upper and a lower berth in the first class, whereas the second-class compartments accommodate six passengers, three berths one above the other, as in West Australia. Sterilised bedding may be obtained on trains at a charge of 3s. for an unbroken journey. On the Canadian railways no extra charge for sleeping accommodation is made to passengers holding second class or colonist tickets, but passengers are expected to provide their own bedding. Tourist sleeping cars are attached to trans-continental trains with few exceptions, and the berth rate is about one-half that in a standard sleeper. Holders of second-class tickets may also use these sleepers at the same charge. Accommodation in compartment cars and standard sleepers is provided only for holders of first-class tickets, and the charge varies according to whether it is an upper or lower berth and the number of nights in the train. This is a rapid survey of conditions obtaining in our great Dominions, and it will be seen that in every case the popular class passenger is catered for, with the exception of the States of Victoria, New South Wales and New Zealand, and where only first-class accommodation is provided, facilities for a night's rest are obtainable by the hiring of pillows and blankets. Cheaper accommodation should be possible by the segregation of through passengers in certain coaches fitted so that rest might be obtained without luxuries."

L.N.E.R. Picture Poster Exhibition.

For the fourth year in succession an exhibition of the London & North Eastern Railway Company's pictorial posters was held in the board room at King's Cross Station. The exhibition lasted three days and was viewed by a large number of visitors, most of whom were generous in their praise of the really fine display of railway art. As before, the coloured holiday poster predominated, but there were one or two departures from this rule—as, for example, the simple but exceedingly effective picture poster by George Bissill, entitled "Coal," and one or two old friends in the shape of "Locomotion No. 1," by Fred Taylor, R.I., and "George Stephenson," by Andrew Johnson. The last-named were, it will be recalled, issued last year in connection with the Railway Centenary. We were also glad to see once more John Hassall's now famous poster, "Skegness"—the old sketch, as re-designed by the artist.

The new posters number 50 all told, and include some of striking design—notably Fred Taylor's Rothesay, Scarborough and Durham Castle; Frank Newbould's Ripon, Scotland and Harrogate; Austin Cooper's England (for exhibition on the continent), Harwich and Holland; Andrew Johnson's Lowestoft and Western Highlands; and U. L. Danver's Scotland, Norfolk Broads and Try a Fly on the L.N.E.R. Conspicuous, too, in the collection, were such charming examples of railway poster art as Bamburgh Castle, by W. Russell Flint, A.R.A.; Bridlington, by R. E. Higgins, R.B.A.; Tynemouth, by J. O. Lambart; and Redcar, by A. E. Martin.

A number of designs, by Morton, used for 16-sheet posters, were also on view; and as a side line, there was a "holiday literature" section, which included a series of capitally produced booklets, the cover designs of which were the work of Freda Lingstrom, and a particularly attractive booklet called "Holidays"—a fine example of off-set printing, the coloured picture on the cover being from the design by Lilian Hocknell. We understand that 200,000 copies of "Holidays" have been printed and are now in course of circulation.

In a brief preface to the very neatly got-up catalogue Mr. W. M. Teasdale, Advertising Manager L.N.E.R., expressed the hope that the company's application of art to the purposes of advertisement

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" may continue to receive the approval of the ever-increasing number of people who are becoming interested in the use of art for commercial purposes." There can be, we think, no doubt about that, after an output of such excellence.

London Stations Criticised.

WHAT is described as a " friendly criticism " of London's railway stations recently appeared in the *Evening Standard*, in the form of an article by the ecclesiastic who recently distinguished himself in connection with a certain broadcasting " skit " on a revolution in London, namely, Father Ronald Knox. There is, of course, nothing new in the idea of criticising London's railway stations; but the light touch which the reverend gentleman brings to his task justifies, perhaps, the present reference to his particular handling of a well-worn theme. " Only Charing Cross," says the writer, " really puts you down in the heart of things, in an air melodious with the bells of St. Martin's; Paddington reaches the fringe of reputable squares, but its immediate neighbourhood is somehow curiously moth-eaten; Victoria, too, has its frontage of mean shops to discourage the visitor." Detailing each of the termini in turn, Father Knox tells us that " Victoria is misshapen, a preposterous duet of Siamese twins "; that those " who look for romance in the South Eastern "—why the South Eastern ?—must go to Charing Cross; that the triad of northern stations that " beckons you away from Bloomsbury seems to invite contrast by mere difference—Euston so severely classical, St. Pancras so flamboyantly Gothic, King's Cross so careless of outward appearances "; Marylebone, which " so humbly and peacefully nestles behind its vast hotel . . . is a pleasant spot; no station is so full of bird song "; Paddington, which " conjures up to the mind all the places which most soothe, by the very thought or them, the mind of the tired city dweller . . . Archdeacons sail up and down the platform like galleons before a breeze. There is a dignity about Paddington."

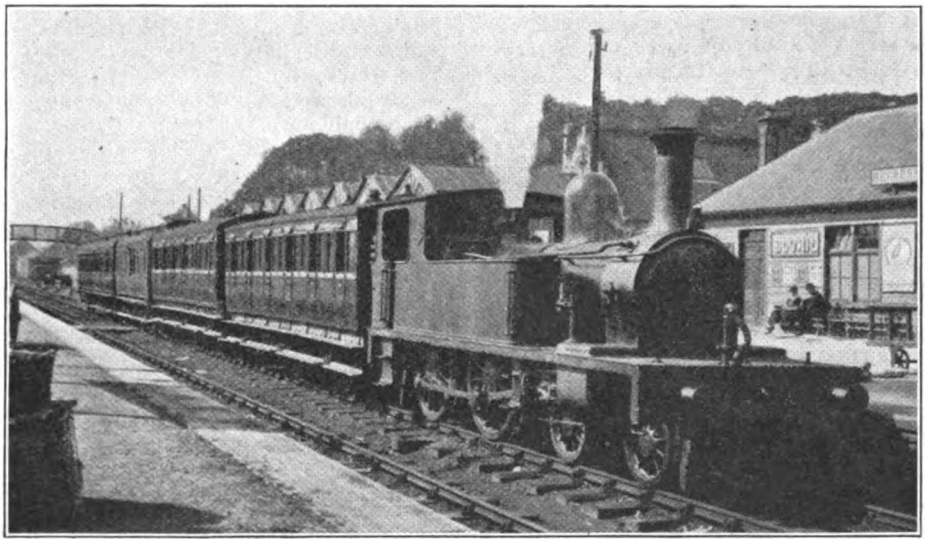

Photo.] [*R. D. Stephen.*

L.M.S., HIGHLAND SECTION, STRATHPEFFER BRANCH TRAIN AT DINGWALL JUNCTION.

4-4-0T locomotive No. 101. Through carriage from Inverness at back of train.

An Exceptional Highland Locomotive.

A PHOTOGRAPH is reproduced sent by Mr. R. D. Stephen. It was taken last August and shows the Strathpeffer branch train at Dingwall Junction. Mr. Stephen also sends the following particulars giving the history of the engine shown. On the Highland line this was No. 101. It was built by Dubs & Co. in 1892 for the Uruguay Eastern Railway, on which line it was to have been No. 1 and would have been named *Olmos*. Together with a similar engine, which became No. 102 in the Highland list, it was purchased by the Highland Company instead of going to South America, and the engines have since been used in this country. No. 102 has been rebuilt with a typical " Drummond " boiler and fittings, but

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No. 101 is still running substantially as built, except that it has never had, in this country, the cow-catchers, large headlamp and sand shields for the crosshead originally fitted. The chimney with its copper top was, of course, quite distinctive as compared with the standard "Jones" chimney of the period. Mr. Stephen further explains that, in 1893, Dubs & Co. delivered three further engines of the same class, but with minor differences, as they had increased water capacity and were fitted from the first with the "Jones" chimney but without the louvres characteristic of his engines as built for the Highland Railway at that time. These engines were originally Nos. 11, 14 and 15, but were renumbered 51, 54 and 52, respectively. The photograph is reproduced as it is a distinctly interesting one. The view shows the through carriage from Inverness to Strathpeffer attached to the branch set.

"Isolated" Railways.

References in our last and previous issues to the Waterford and Tramore Railway have resulted in quite a heavy correspondence, as indicated by the "Pertinent Paragraph" published in the May number. Commenting on the same matter, Mr. W. C. Gentry writes as follows:—"Instances of isolated railways are very rare, and, so far as standard gauge lines are concerned, that of the W. & T. line is apparently unique. Until recent years, the Cork, Bandon and South Coast Railway, with its satellite light railways, was physically isolated, but the opening of the Cork City Railways afforded a connection with the G.S. and W. line. The Cork and Macroom, also a standard gauge line was, up to the period of the amalgamation, isolated, and I am unaware whether a connection has since been put in to the Bandon line. In Great Britain there does not appear to be an instance of an isolated standard-gauge line, the nearest approach being the Corringham Light Railway in Essex, which operates passenger traffic over a line totally disconnected from any other railway. This line, however, possesses a goods traffic connection with the Thames Haven branch of the L.M.S. With narrow-gauge lines, there are several instances of 'isolation,' the loneliest being the Campbeltown and Machrihanish Light Railway, which is over 70 miles from the nearest connection by land. The Rye and Camber, Dublin and Blessington, Cork and Muskerry and Cork, Blackrock and Passage lines are also unconnected with the trunk systems."

Model Railway Club Exhibition.

An interesting and very varied exhibition of work by members of the Model Railway Club was held in the Kingsway Hall, Kingsway, W.C.1, on April 15, 16 and 17. There was a record attendance, indicative of the large interest taken in the work of the Club. All the popular classes of locomotives in this country, ranging from L.N.E.R. "Pacifics" and G.W.R. "Castles" to Brighton 0-4-2 tanks and 2-2-2's, and G.N.R. and Midland "singles," were well represented. Among the exhibits may be mentioned an "00" gauge country terminal complete, shown working by Mr. W. P. Ashdown; a country station in "0" gauge by Mr. F. N. Lance, with particularly realistic passengers and staff, the work of a lady sculptor; some very fine "00" gauge electric goods and passenger trains by Mr. H. G. Kerr; model of a narrow-gauge engine for the Metropolitan Water Board, by Colonel R. Hervey; route-indicating signal, by Mr. L. G. Brampton; and track, by Mr. C. G. Harrison. Mr. Knok showed a 2-8-8-2 Mallet articulated compound locomotive for "0" gauge, and the up-to-date nature of many exhibits was evidenced by Mr. G. P. Keen's "0" gauge, heavy L.N.E.R. "Garratt" engine. This year there were considerably more models in the larger scales, notable among which were 2½-in. gauge tank engines by Messrs. A. L. Lee and T. W. Pitts, Mr. E. Attenborough's "Atlantic," on a ¾-in. scale 8-ft. G.N.R. single locomotive. The work by the junior members was very creditable and included "0" gauge locomotives by Messrs. W. D. England, B. L. Miller, and C. W. Pond. The electrical side was well represented, among the exhibits being "0" gauge Metropolitan electric locomotives of exceptional finish by Mr. S. J. Beeson. Improvements have been made to the Club track since last year, and it is now electrified. Mr. Crebbin's 4-6-0 *Cosmo Bonsor* and 4-6-2 *Aldington* proved great attractions, and were busily engaged hauling the youngsters on the track kindly lent by the Society of Model Engineers. Trade exhibits included stands by Bassett-Lowke Limited, Bond's of Euston Road Limited, Percival Marshall & Co., and A. Crick, of Wembley, who exhibited an excellent scenic display. A pleasing incident at the close of the exhibition was the presentation to Mrs. G. K. King of an "0" gauge model Dockyard saddle tank locomotive, in recognition of her labours on the reconstruction of the Club track.

Third-Class Refreshment Cars in India.

In spite of the low fares charged, the receipts from the third-class passenger traffic on Indian railways form a very high proportion of the total coaching earnings. In these circumstances it becomes obvious that any improvements in the facilities afforded to third-class passengers must necessarily

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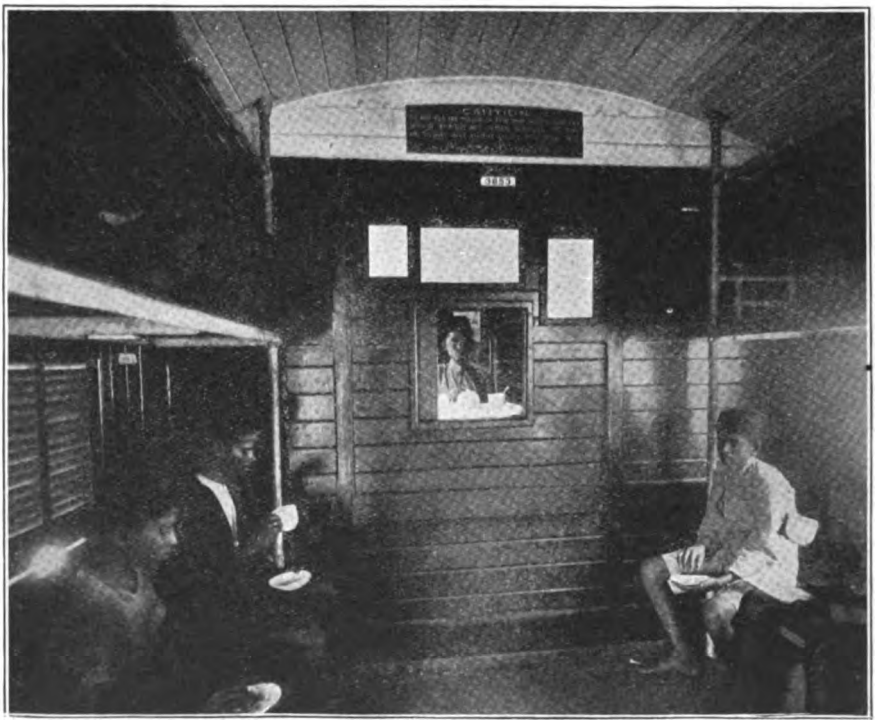
affect a considerable percentage of the travelling public. Unfortunately, in levelling criticism against the standard of comfort afforded this class of passenger, the low rates on which the third-class fares are based are rarely, if ever, taken into consideration by those who voice the criticism. Nor is due consideration given by them to the average speeds of the trains between towns and industrial centres many hundreds of miles apart in a country where the operating conditions are very different from those appertaining to Europe. The demand for improved facilities for third-class passengers is reiterated without any regard either to the elements of economics or of the conditions of travel replaced by the service so continually decried.

In these circumstances the introduction on the G.I.P. Railway of a refreshment car for third-class passengers on the express service between Bombay and Delhi becomes a matter of considerable interest. It must further be borne in mind that, in considering the provision of facilities which are regarded as standard features of travel in Europe and other " white " countries, the Indian railways have to consider racial and religious aspects. Hence, the attempt to supply refreshment-car facilities for third-class passengers on Indian railways has called for arrangements of a special character.

Some time ago a rake of three cars was fitted up by the Great Indian Peninsula Railway (now part of the Indian State system) to provide for the needs of native passengers in this respect. The refreshment bar is located in one of the end cars to enable the accommodation for female passengers to be segregated from that for male passengers. The end, therefore, includes a smaller compartment for intermediate class female passengers, and a longer one for third-class female passengers, a side corridor giving either class passengers access to a serving window through which they are supplied by the refreshment-bar staff. The refreshment bar has, however, no other communication with this section. On the other side the refreshment bar has a serving window through which male passengers are supplied from a small third-class compartment. The remaining two coaches are entirely third class or intermediate, and reserved for male passengers, vestibuled connections giving access to the refreshment bar on that



PORTION OF ADJACENT PASSENGER COMPARTMENT.

Accommodation for male passengers and serving window therefor.

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side for passengers in both of the attached vehicles.

In order that a regular supply of freshly-cooked food may always be available, special cooking facilities have been provided, and the various types of food and sweetmeats required by Hindu and Mahommedan passengers are carried. An adequate supply of mineral and sweet waters is also carried, with the necessary ice supply for cooling them during the hot-weather months; fresh supplies of ice and waters can be obtained *en route* as found necessary. The general interior arrangement of the refreshment compartment can be seen from the illustrations, which show also a view of the adjoining male passenger compartment.

On the same subject, the Madras Manager of the Catering Department of Spencer & Co. Ltd., refreshment-room contractors to several Indian railways, writes explaining that cars of this type have now been in use for some years, also mentioning that on the North Western State Railways complete refreshment cars for the use of Indian passengers are attached to some of the passenger trains. Further, the cars for European passengers run on the mail trains usually supply Indian gentlemen, particularly those who have been to Europe and America. "They patronise the cars very frequently, and are also very good customers of our refreshment rooms." On the Madras and Southern Mahratta, South Indian and Mysore State Railways there are bogie carriages, portions of which constitute refreshment buffets for Indian passengers.

INTERIOR OF REFRESHMENT COMPARTMENT.

Showing arrangement of supplies and serving window for female passengers.

Folkestone Railways.

In view of "Pertinent Paragraphs" dealing with matters of interest relating to Folkestone, published in the March Railway Magazine, Mr. H. D. Hewitt writes as follows:—

"I remember seeing the harbour swing-bridge used in about 1898, and it was done—as stated—by haulage from a crane-drum. But I do not remember seeing any unbolting of fish-plates, and, as far as I remember, the whole operation took less than 10 minutes from the time the train passed over until the bridge was open ready for a ship to come out. N.B.—The 'Tidal' that day started from the harbour proper, not from the pier as usual. Possibly the fishplates at the join of bridge and main

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girder are a later introduction with more modern permanent way.

"I had old relatives who had lived in Folkestone, and they regarded the Junction as being quite outside the town, 'in the Folly Fields,' as they called it. At last now the town seems to be growing up to and round it. The reason why the S.E.R. did not provide through roads, &c., as at Ashford and Tonbridge probably was that the directors considered that Folkestone, being the 'key to the Continent,' no trains between Ashford and Dover would ever give Folkestone the go-by.

"It was not until 1860, when the L.C. & D.R. had captured Dover and its steamboats that they realised their error. But why after that Folkestone Junction was never rebuilt is more than I can say. Possibly this may come now that the town is extending more that way.

"Very few travellers to the Continent seem to realise this awkward 'back-handed' junction and incline at Folkestone, and cannot imagine why the boat trains to Folkestone (say 73 miles) take a quarter of an hour longer than those to Dover (5½ miles further on).

Further Comments.

"I THINK that the real reason why the projected extension from Sandgate terminus to Folkestone Harbour direct was never carried out was the huge cost of a lower but longer and curved Foord Viaduct approached by an incline from Sandgate only a little less horrible than that of the present line from the junction. I also thought that the projected position of this line was scarcely along the shore, but a little more inland than your paragraph seems to indicate; this would probably have meant purchase and demolition of expensive properties in the town. Now that 4-6-0 engines are employed, one would imagine they could be allowed down the incline even if assisted up it by the usual Harbour' engines. In the 7 ft. 4-4-0 days, of course, this was impossible. When I was there in 1898, &c., the 10.0 a.m. boat express *ex* Charing Cross usually consisted of 12 to 15 six-wheeled vehicles plus two four-wheeled trolleys for registered baggage-boxes, and the rule was, anything over 10 coaches had to have a rear-pilot up the incline, which meant always.

"The Ostend boat service was also worked off the same train (10.0 a.m.), and usually consisted of two eight-wheelers and a van, which the London engine worked forward to Dover after getting rid of the harbour vehicles. Eight-wheeled stock (specially short) was first used into Folkestone Harbour about 1901 or 1902, usually mixed with six-wheelers. I think the first boat train of *all* eight-wheelers came about 1904, after the pier curves had been modified."

Harbour Branch Locomotives.

"*Re* 'Harbour' engines, these are continually being changed, and I suppose your contributor referred to the nine in use when he was there. There are about 25 of this class, but five of them are restricted (or nearly so) to the Whitstable–Canterbury section, having specially short funnels to clear the Tyler Hill tunnel. Three at least of those your contributor mentions were there in 1898, viz., Nos. 152, 153, and 155.

"Your contributor says 'all are domeless,' probably meaning those with numbers mentioned. But some of this class certainly have domed boilers now, including two of the 'Whitstable' engines. According to my notes, Nos. 155 and 342 now have domed boilers, and probably No. 153 also. Those with slightly shorter funnels (*not* 'Whitstables') are those which have had 'raised' Stirling pattern boilers put in, probably between 1901 and 1904, when quite a number of S.E. engines received them, including 0-6-0 tender goods, 0-4-4T's, 4-4-0's (class A. 6 ft., now all scrapped). I suppose that they were Stirling boilers in stock at Ashford from pre-amalgamation times. I do not think they were larger than the original ones, only higher pitched; at least, when I inquired about the new boilers of the 0-4-4T's and 0-6-0's I was told they were the same diameter as the old ones, viz., 4 ft. 4 in. Whether the pressure was higher I am also uncertain. The Stirling 0-6-0 tender goods had only 140 lb. originally, but the 0-4-4T's had 150 lb. Whether the 0-6-0's had 140 or 150 is also unknown to me. In 1923 I noted No. 341 at Folkestone with its *original* type of low-pitched boiler. In 1898 the only 'shunter' was a little 0-4-0T by Manning, Wardle & Co., No. 313, which has now probably gone to scrap."

Railway Travel in India.

IN view of Mr. D. B. Sullock's article on "Across India by Rail," published in the February number, "Dieppe" sends a description of a similar journey made before the war from Agra (Cantonment station) to Dehra Dun, as follows:—"Agra lies on the G.I.P. main line from Bombay (Victoria) to Delhi, *via* Bhopal and Jhanis, and is an important traffic centre, with large locomotive sheds, &c. All engines are changed here, and the principal expresses stop for about 20 minutes or more. It was on a summer day in 1913 that the writer boarded the Down Punjab Mail, bound from Bombay (Victoria) to Lahore, on the North Western

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State line. The Down Mail consisted of seven or eight bogie G.I.P. and N.W. Joint Stock coaches, bound for Lahore, a through G.I.P. coach for Kalka (for Simla) on the East Indian line, a through G.I.P. coach for Dehra Dun, and a G.I.P. 'diner', detached at Delhi. It was hauled, if I remember aright, by two G.I.P. small 4-4-0 type locomotives. The mail left at (about) 4 o'clock in the afternoon; a short run brought us to Muttra Junction, where connection is made with the Bombay, Baroda and Central India line. Delhi was reached at 9.30 p.m. Here the restaurant car was detached, so also the Kalka coach, which continued its way to Kalka over the E.I. main line behind the Down E.I. Punjab Mail. The N.W. Railway now took us over, and one of their large 4-6-0's hauled us over the Jumna Bridge and so on, *via* Meerut, to Saharunpur, where the Dehra coach was left behind. The Lahore portion went on, *via* Amritsar, to Lahore. Saharunpur is the junction between the N.W. and O. & R. Railways, and the northern extremity of the latter.

Further Experiences.

"After some five hours' wait, a through train from the N.W. line to Dehra Dun picked up the through coach from the G.I.P. line, and we started on our run over the O. & R. line behind one of their 4-0-6's. A reversal was made at Llahksar, and Dehra was reached about 10.30 in the morning. Incidentally, I rather think the through Calcutta-Dehra coach was attached to our train at Llahksar. Soon after leaving Hardwar two short tunnels are traversed, which must be the only tunnels on the O. & R. system. Rumour says that a small stream seen by the side of the line in this district is the Ganges, which rises some forty miles to the north. Dehra Dun station can show some interesting specimens of passenger rolling-stock, including coaches belonging to the O. & R. Company, the E.I. Railway (through from Calcutta), the G.I.P. Railway (through from Jhansi), the N.W. State Railway (through from Peshawar or Lahore), G.I.P. and N.W. Joint Stock (through from Jhansi) and the B.B. & C.I. Railway (through from Bombay, Colaba station). This medley is, of course, seen only in the 'season,' when the hill-station of Mussoorie is patronised by Europeans. In 1913 the writer heard that no railway could be constructed up the mountains to Mussoorie, owing to the crumbling nature of the soil.

"The G.I.P. and E.I. locomotives offer a contrast to ordinary locomotive practice, being painted a dark red hue, as opposed to the everlasting black livery, and being without the double cab, also a common design in India. No systems in India appear to own corridor coaches, save the South Indian (narrow gauge) and Eastern Bengal State lines. This involves a walk along the platform of a wayside station in order to reach the restaurant car, if there is one. An extremely large amount of time seems to be spent at junctions and large stations during the changing of locomotives and replenishment of carriage water supplies. This time, however, is usually made up on the runs between stops, when the speed of the mails, or express trains, is often round about 50 m.p.h. But speed means dust, which manages to penetrate into the travellers' compartments, in spite of wire gauze shutters to the windows and other precautions."

A South Coast Stationary Engine Incline.

It may not be known generally that the rail connection between Kingston Wharf, on Shoreham Harbour, and the main Brighton-Portsmouth section of the Southern Railway, is over an incline; trucks being hauled up by a stationary steam engine. The highway and the railway are parallel, about 50 yards apart, the railway being on an embankment. There are sidings alongside the railway served by a goods line from Shoreham, the incline is at a right angle to the running lines and sidings, access to it being by turntables.

There are two roads between the sidings and the wharf; one is reserved for trucks going down, the descent being by gravity, controlled by the wagon brakes. Trucks coming up from the wharf use the other road and are hauled up by an endless chain actuated by the stationary engine. The wagon weighbridge is under the roadway viaduct. The incline commences a few yards beyond, one end of a long chain is attached to the front draw hook of the wagon to be hauled up, and the other to the incline chain. The engine is set in motion and hauls the wagon till it is over the incline chain. A shunter then sprags the wagon, removes the connecting chain, and connects the rear draw hook, with the hauling chain under the wagon, a shorter and stouter connecting chain being used for the purpose. The endless hauling chain runs down the incline on rollers between the rails and over a drum at the bottom, the connection for hauling being made with the upper or ascending portion of the chain. Upon receiving a signal, the engineman starts winding and the wagon is drawn up to the turntable, a distance of about 125 ft.; the ascent being at about 1 in 11. At the top of the incline the hauling chain, instead of following the gradient of the incline is continued on the

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level, this causes the hook on the connecting chain to become detached, and the wagon runs on to the turntable. A shunter accompanies each truck up, with a sprag under a rear wheel, in case the chain should break, or the connection becomes unhooked. Only one loaded wagon, or two empty trucks, are hauled up each time.

The Motive Power.

THE stationary engine-house is situate on the far side of the railway, so the continuous chain passes from the incline top to the drum under the running lines. The drum itself is outside the engine-house, the rotating shaft passing through the wall. The engine has been in use probably from the time the line was opened—1840—and was built by Hicks & Son, of Bolton. It consists of a single cylinder, fixed in a vertical position, the piston rod coming through the upper cover, and it drives the shaft, on which is a heavy flywheel, about 5 ft. diameter. On the far side of the flywheel the shaft is doubled cranked, and beyond is a coupling arrangement, worked by a lever, to put the winding shaft in gear. Steam is provided by an old (horizontal) locomotive boiler, which has a huge steam dome. The present boiler has been in use about 16 years. Above the engine-house is a water tank; below the house is a well; the cranks on the driving shaft actuate pumps, which raise the water into the tank, sufficient water is at present raised by one pump, so the second crank has now no pump connection. The water is used for locomotives, for the pumping engines, for the steam crane on the wharf, and for watering the horses used for shunting (no locomotives being employed there). In view of the circumstance that when the railway was laid out it was usual for lines to cross roads on the level (as at Nine Elms, for instance), a great deal of rail traffic must have been expected to pass to and from Kingston Wharf, or the roadway would not have been constructed to cross the two lines on a viaduct; it rises from the level for a distance of about 400 ft. each side of the arches under which the rails pass. The arches about 24 in number, are used as stores, for stables, dwelling-houses, &c. Perhaps the circumstance that the incline was to be power-worked, led to the determination to carry the road over the lines by a bridge.

When the wharf was laid out it was expected that the L.B. and S.C.R. goods traffic to and from France would pass through Shoreham Harbour, but this soon was conveyed *via* Newhaven. Seaborne traffic for Brighton was also expected to make use of Kingston Wharf, but what little there now is of this mostly makes use of the eastern arm of Shoreham Harbour, and is conveyed thence to destination by road. There is now but little water-borne traffic at Kingston wharf, but as the local goods traffic is dealt with there, business is generally brisk.

Where Rail Motor Halts are Many.

ATTEMPTS to meet the competition of road transport in the districts surrounding large towns were made by most of the railways in the first fifteen years of the present century. Usually halts (or *haltes*, as they were originally called by the Great Western Railway) were erected between stations, served by rail motors, or motor trains, at more or less frequent intervals. These halts were chiefly short platforms, with a waiting shed, no staff being in attendance.

The London, Brighton and South Coast Railway adopted the practice wholeheartedly, and between Brighton Central and Worthing the number of halts probably exceeds that to be found elsewhere in the same length of railway. Westward from Brighton the order of these halts is: *Holland Road, half a mile from Brighton; Dyke Junction, half a mile beyond Hove; Fishersgate, half a mile west of Portslade; Bungalow Town, a mile beyond Shoreham-on-Sea; and Ham Bridge, a mile west of Lancing. There are thus 13 stations and halts in the 11½ miles between Brighton Central and West Worthing, both of which are included. Bungalow Town was a busy halt serving the big collection of bungalows (largely composed of old railway carriage bodies) on the shingle between Lancing and Shoreham Harbour, till about three years ago, when direct access was provided by a footbridge across the Adur at Shoreham, which transferred much of the railway traffic to Shoreham-by-Sea station, although there is a toll of 1d. each way across the footbridge. Ham Bridge halt serves the east end of Worthing, and might be called "East Worthing."

The L.B. & S.C.R. adopted the same plan to develop the traffic at the other end of its western coast line, *i.e.*, between Chichester and Portsmouth. The distance here is 16 miles, and the number of stations and halts (including Chichester and Portsmouth) is 11. Fishbourne, 2¼ miles west of Chichester, is the first halt; a mile and a half beyond Bosham is Nutbourne; and a mile farther is Southbourne. One mile west of Emsworth is Warblington, whilst the last of the halts is Bedhampton, three-quarters of a mile beyond Havant. There is an intensive motor-bus competition on both routes, whilst along the road between Brighton and Worthing houses

* Many years ago there was a passenger station about this spot.

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are as thick as along the Uxbridge Road between Marble Arch and Hayes.

Plymouth and District Halts.

THE Great Western Railway has provided a number of halts (some are called "platforms") around Plymouth. Westward from Plympton, after a run of 2¼ miles, is Laira Halt, succeeded a mile farther on by Lipson Vale Halt, half a mile east of Mutley station, which in turn is only half a mile from North Road. Along the Cornwall line westward are: Dockyard Halt, ¼ mile west of Devonport station, with Ford Halt half a mile beyond; St. Budeaux Platform is ¾ mile west of Keyham station, and Defiance Platform is ¾ mile beyond Saltash station. By this route (not running into and out of Millbay) there are 11 stations, halts and platforms in 6¾ miles between Laira Halt and Defiance Platform, both included. On a large portion of this section there is a very frequent service of trains and rail motors. Some run from each direction only as far as Millbay and vice versa, whilst others run through via Millbay, the remainder using the direct line between North Road and Devonport.

Buffer Stop Collision at Brighton.

ON Sunday, March 7, a slight mishap occurred at Brighton Central station, S.R., the 3 p.m. train from Lewes, consisting of four bogie coaches, drawn by 4-6-4 tank engine No. 329 coming into collision with four vehicles standing on No. 10 line against the buffer stops. Some damage was done to rolling-stock and the buffer stops, and three passengers and the guard of the colliding train complained of shock or slight injury. According to Major Hall's report to the Ministry of Transport, there was no suggestion of excessive speed and the signalling is not criticised adversely. It is pointed out that it was unusual for the driver in question to work this train and on those occasions he had run into No. 4 platform. Acknowledgment is also made of the obscuring effect of steam from an engine on an adjoining line, but a degree of responsibility is placed upon the driver and more particularly his fireman. Major Halls' report concludes with the following comment:—

"There is little to criticise in the working at this terminal station. The use of a distinctive signal to indicate any occupation of the road up to about half the platform length is a common one—though the actual form of the signals used for the purpose at this and some other terminal stations on the Brighton section is unusual—and enginemen are commonly required to ascertain by their own observation, after receiving this warning by signal, how much of the latter half of the road is in fact occupied. The working at Brighton in this respect is similar to that at other terminal stations. No. 10 road is certainly a good deal shorter than most of the others—it is, in fact, the shortest road by over 100 ft. of all those signalled for double occupation—but it is largely used for short motor trains, and the dual occupation indication is of value for normal working."

An American Railway Centenary.

ON April 17, 1826, the Legislature of the State of New York granted a charter to the Mohawk and Hudson Railroad, and in view of the fact, the New York Central authorities, whose system incorporates this old line, arranged for centenary celebrations on April 17 last. The proceedings included a trip over the 17 miles of line between Albany and Schenectady, as it was on this section that the old "De Witt Clinton" locomotive and train made its first trips on August 9, 1831. This engine, which has for some time held an honoured position in the hall of the Grand Central terminal in New York, was again placed on rails, with some of its old cars, so that it figured in a "pageant" of locomotives representing development. Bronze tablets were placed on the walls of the depots at Albany and Schenectady, and the proceedings terminated with a banquet in New York. While congratulating our United States friends on this interesting event we may point out that, on the basis of opening for traffic, this centenary is not due until August 9, 1931, as traffic was inaugurated in 1831. Otherwise we should have held our own centenary proceedings in 1921, one hundred years from the date of the Act under which the Stockton & Darlington Railway was passed, whereas last year's proceedings celebrated the centenary of traffic inauguration.

Advertising Value of Spick and Span Locomotives.

COMMENTING upon the large amounts which are being spent by the leading railway companies on poster and other publicity propaganda, involving the retention of the services of leading artists, and, in the case of certain lines, Royal Academicians, a London reader suggests that not sufficient is made of the advertising value of locomotives and trains. There can be no question that, although scenic views and poster publicity account for a great deal in influencing prospective passengers to travel by a particular line or to visit one holiday resort in preference to another, a very large proportion of the travelling public, not entirely in the junior section, is as much, if not more, interested

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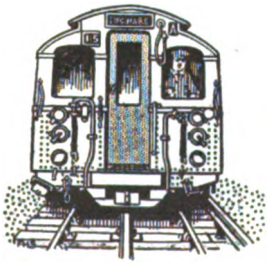
in the locomotives themselves and in the work they do. One has only to note the little group of interested onlookers which can be seen in the neighbourhood of an engine attached to a principal express train on almost any line, to realise that this interest is real, while one has but to listen to what is said or enter into conversation to appreciate that, although the knowledge indicated may often be superficial, frequently there are evidences that the person concerned knows at least the generalities of locomotive construction and can speak intelligently as to principal features and the work done by the engines in question.

Appearance of Engines and Vehicles.

Our correspondent's main point is, however, that on certain lines, if not generally, insufficient attention is paid to the appearance of locomotives and rolling-stock, so that, although the trains worked may rank among the most important in the country, and may perhaps be included among the world's most famous trains, their appearance, as seen at one of the great terminals or at a big junction station, can hardly be regarded as constituting a good advertisement. There is no question that a clean, well-painted locomotive in good superficial condition, attached to a train of coaches of relatively uniform types, tends to attract public interest on its own account, while if it also carries neatly-designed boards indicating the character of the train, no one who sees it can go away without realising the importance of the train concerned. We may further add that, in so far as locomotives constitute good advertising media, there is much to be said for the policy of naming locomotives, and, while we are glad to find that two of the great post-grouping companies are developing the practice of naming their express locomotives, it cannot but be regretted that another is not placing names on its new engines. It may be that there is no actual need for a locomotive engine to bear a name, and frequently the names given are distinctly inappropriate, in that they apply to what is, after all, merely a travelling collection of machinery to which the names can have little or no actual relation. The fact, however, that so many people have come to associate an element of personality with locomotive engines, and that so keen interest is taken in the work done, as well as in the engines themselves, indicates that to keep the engines in good superficial condition and to give them the added interest of names is not pandering to an unjustifiable public demand. It may be that a locomotive is in good working condition, although its paint may be soiled and it may appear relatively disreputable, while, obviously, the question of the attachment of name-plates is a side issue. There is, however, every evidence that popular interest in locomotives and express trains, if not in the more ordinary work of a big railway, is an important advertising asset and applies to a large section of the travelling public.

The point is also taken by our correspondent that, not only should the locomotives hauling principal trains, if not those engaged on all duties, be kept in reasonably presentable condition, but that the coaching stock should be kept in a condition which will harmonise with the engine. He also refers to the tendency on some lines to do away with special name boards for particular trains, though on other lines this practice is extending. A train whose nature can at once be identified by any one who sees it, constitutes, in effect, a travelling advertisement, the influence of which may be both valuable and far-reaching.



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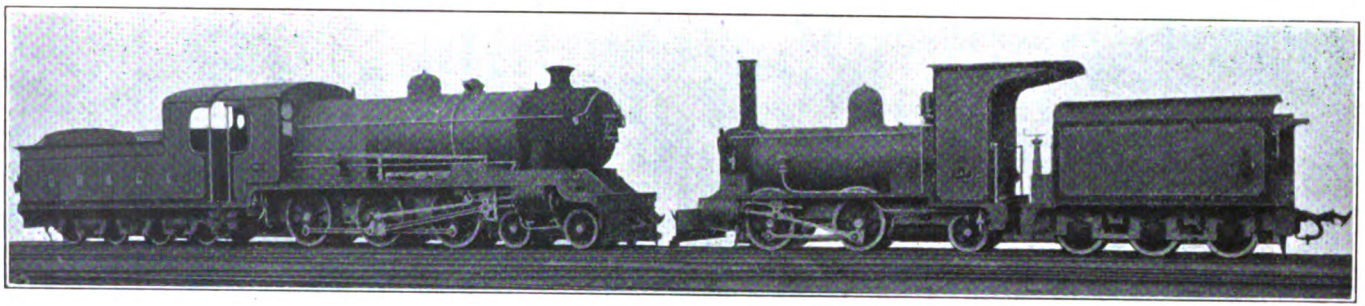
METRE-GAUGE LOCOMOTIVES ON THE BOMBAY, BARODA AND CENTRAL INDIA RAILWAY.



THE photograph reproduced shows a new 4-6-0 locomotive recently built for the Bombay, Baroda and Central India Railway, and claimed to be the largest of its class used on metre-gauge railways in India, compared with an old 0-4-2 engine introduced in 1876. The latter locomotive had cylinders 11½ by 17 in., coupled wheels 3 ft. ½ in. diam., a total heating surface of 430 sq. ft., grate area 6·9 sq. ft., and boiler pressure of 140 lb. per square inch. The tender carried 1,200 gallons of water, and the weight of engine and tender together was 30·1 tons.

The new goods engine was built in the Ajmer shops, and is one of 15 intended for service for heavy goods traffic between Bandikui and Sojat Road. It has cylinders 16½ by 22 in., coupled wheels 4 ft. diam., heating surface 1,056·28 sq. ft., grate area 22·2 sq. ft., steam pressure 160 lb. per square inch, weight of engine in working order 37·05 tons, and weight of engine and tender in working order 70·95 tons.

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WHAT THE RAILWAYS ARE DOING.

We are officially informed that Mr. E. Wharton, Assistant Mineral Manager, L.M.S.R., has been appointed to the position of Mineral Manager as and from June 1 next, in succession to Mr. A. W. Allen, who is retiring.

Mr. C. N. Mansfield will succeed Mr. Wharton as Assistant Mineral Manager from the same date.

* * *

We are officially informed that the directors of the London and North Eastern Railway have appointed Mr. S. W. Groom, at present Assistant Running Superintendent for the Southern Area, to be Locomotive Running Superintendent, Scotland, in succession to the late Mr. J. P. Grassick.

* * *

We are informed that as from July 1, 1926, Mr. D. Sayer, at present Locomotive Accountant for the Great Northern and Great Eastern Sections of the Southern Area of the London and North Eastern Railway, will take charge of the whole of the locomotive accountancy work in that area.

* * *

MR. G. E. ORTON,

Appointed Assistant Publicity Agent, Great Western Railway.

Mr. George Ernest Orton, who has been appointed Assistant Publicity Agent, Great Western Railway, entered G.W. service in 1903, in the Advertising Department. In 1912 he was transferred to the General Manager's Department, and was there engaged in the section dealing with joint arrangements and private sidings, Board of Trade regulations and accidents and, latterly, with new works. Except for a period of about 2½ years on war service, Mr. Orton remained in the General Manager's Department until February, 1923, when he returned to the Publicity Department of the office of the Superintendent of the Line, thus leading the way to his present appointment.

* * *

Mr. J. C. Marquis, who has been appointed Divisional Solicitor, Manchester, L.M.S.R., was educated at Birkenhead School and Trinity College, Cambridge (Honours Classical Tripos). He was then articled, afterwards becoming Managing Clerk to Alsop, Stevens & Co., Solicitors, Liverpool. In due course he was appointed Assistant to the Liverpool District Registrar, High Court, Chancery and Admiralty Division. In 1905 he entered the Solicitor's Department of the Lancashire and Yorkshire Railway, under Mr. Parmiter, with a view particularly to Admiralty, Chancery and Lands Clauses work. Later, he was concerned with the conveyancing and general litigation work of the department, and has continued similar duties since the formation of the London Midland and Scottish Railway. Mr. Marquis has taken a leading part in athletic matters, and on several occasions played Rugby football for England and the North.

* * *

We regret to record the death, on May 2, after a short illness, of Mr. James Cockburn,

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formerly Signal Superintendent, London Division, L.S.W.R. He saw much of the early signalling on English railways, especially on the L.S.W. Railway, whose service he entered in 1855 as an apprentice in the Locomotive Department. In 1862 he left to join a signal firm, but rejoined L.S.W.R. service in 1868 as Signal Foreman. Subsequently, about 1875, he was appointed Signal Superintendent of the London Division. This position he held until his retirement in 1914 after a total service of 53 years. He was one of the original members of the Association of Railway Companies' Signal Superintendents and Signal Engineers, and was their second President in 1892. Subsequently, in 1893, on the appointment of the late Mr. J. P. Annett as Chief Signal Superintendent, Mr. Cockburn resigned his membership of the Association as only one representative from each company was recognised.

* * *

COLONEL SIR JOHN PRINGLE held an inquiry on May 13 into the derailment of an Edinburgh–London express, L.N.E.R., at Cramlington, on Monday, May 10. The evidence showed that the permanent way had been tampered with, and that a volunteer patrol had been interfered with, presumably by colliery strikers.

* * *

THE directors of the G.W.R. have authorised the provision of new passenger halts on the following sections :—(1) At Horfield, between Ashley Hill and Bristol ; (2) near Greenford (Middlesex), on the branch line from West Ealing ; and (3) at Christian Malford, on the main line from London to Bristol, between Dauntsey and Chippenham.

* * *

WITH the advent of the summer timetables various improvements have been announced by different French lines. A new train known as the "Nord Express," and composed entirely of sleeping cars, will be run by the Nord Railway to Berlin daily, and three times a week to Warsaw. One section of this train will leave Paris at 15.10, and another section will leave Calais at 14.40 (in connection with the 11-a.m. train from Victoria), on day A, arriving in Berlin at 8.48 a.m. on day B. Three times a week this train will go on to Warsaw, arriving at 20.30 on day B. Every day a sleeping car will be run from Berlin to Riga, arriving at 9 a.m. on day C. Return services will also be run from Riga, Warsaw and Berlin, the train from Berlin leaving at 22.15 and arriving in Paris at 15.30 and at Calais at 15.25 the next ; the connection for London arrives at 19.15.

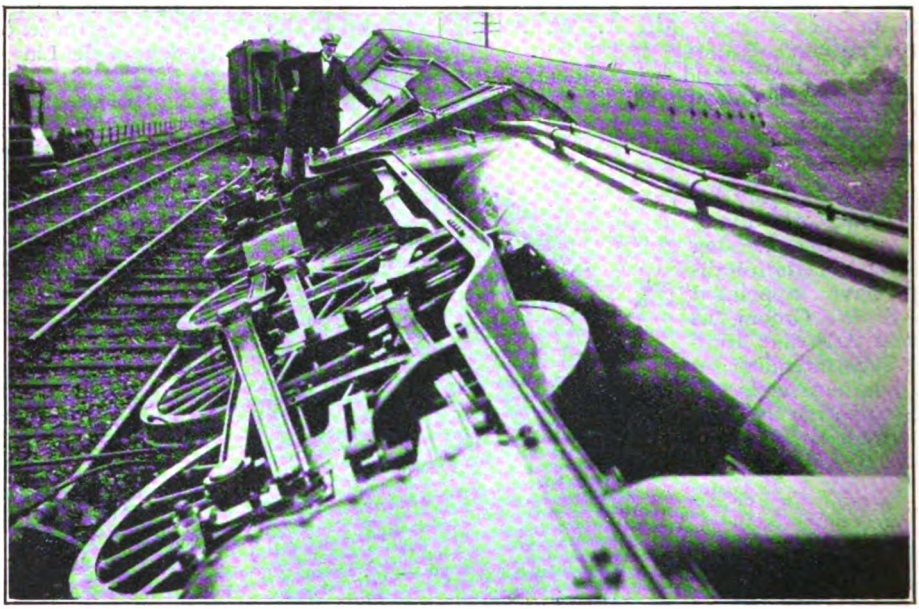

Photo.] WILFUL DERAILMENT AT CRAMLINGTON, L.N.E.R. [*Topical.*

* * *

THE newly-electrified section between Sestri Levante and Spezia, Italy, was opened on April 21. Its length is 27 miles. This

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completes, for electric traction, the route from Modane, on the French frontier, to Sestri Levante, a distance of 225 miles. The further section of 58 miles to Leghorn is in process of equipment, and when ready electric traction will be practicable from Modane to Leghorn, 283 miles.

* * *

THE Southern Railway has placed orders for 500 12-ton open goods wagons, 125 each with the Metropolitan Carriage, Wagon & Finance Co. Ltd., the Gloucester Railway Carriage & Wagon Co. Ltd., the Birmingham Railway Carriage & Wagon Co. Ltd., and the Midland Railway Carriage & Wagon Co. Ltd.

been stationed at Machynlleth shed for some time past.

* * *

THE inaugural general meeting of the "Transport Observation and Models Society" was held at St. Bride's Institute on April 22. The meeting was a successful one, and a good start was made on Saturday, April 24, by a visit to the L.N.E.R. sheds at King's Cross. The party was received with the customary courtesy of the L.N.E.R., and the visit was much appreciated by all who attended. A comprehensive list of fixtures for the year has been arranged.

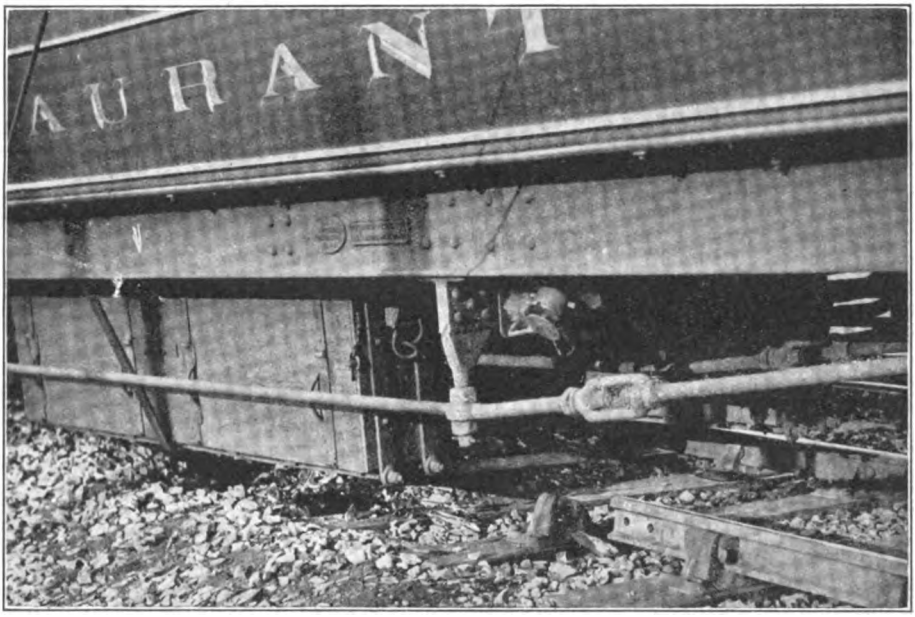

Photo.] **VIEW SHOWING REMOVED RAIL AT CRAMLINGTON, L.N.E.R.** [*Topical.*

THE Southern Railway has placed contracts with British firms for 30,000 tons of rails, 700 tons of fishplates and 10,000 tons of conductor rails for delivery to commence in November and be completed by June, 1927. We also understand that the contracts of a large proportion of the company's rail requirements have been extended for a further period of six months beyond the expiration of the existing contracts.

* * *

SEVERAL readers have pointed out that the locomotive illustrated on page 374 of the May number is a Brecon and Merthyr engine (No. 20), and not a Cambrian, as stated. Mr. J. A. Higgon mentions that the only alteration it has received is a G.W.R. type safety valve, new painting, &c. It has

Mr. S. M. W. Hann, "Frensham," Shirley Road, Croydon, the Secretary of the Society, desires it to be understood that it is not merely local membership that is sought for, but suitable members will be welcomed from any part of London, and he will be glad if those interested will kindly communicate with him at the address given above.

* * *

MR. G. E. ARGENT points out that centre conductor rails are being laid on the Lancashire and Yorkshire electric routes from Liverpool to Southport and Ormskirk. Hitherto the running rails have been used for electric current return, but has suggested that the system of a separate negative rail as used on the Metropolitan, Metropolitan

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District and L.M.S. lines in London is to be adopted in this area.

* * *

OWING to the separation of the necessary information from two prints sent in by Mr. P. Ransome-Wallis, the reproductions of his photographs on page 212 of the March RAILWAY MAGAZINE, showing G.C. 4-4-0 locomotive No. 128B, and on page 349 of the May number, illustrating L.N.E.R. No. 4477 fitted with indicator shelter, were published without acknowledgment. We shall be glad if readers will associate these reproductions with Mr. Ransome-Wallis' name.

* * *

ON Tuesday, April 27, the Society of Model and Experimental Engineers held a meeting at Caxton Hall, Westminster, S.W.1. Mr. Otho Nicholson, M.P. for Westminster, was present and drove Mr. Crebbin's model 4-8-2 locomotive, *Sir Felix Pole*, on her maiden trip. A number of model locomotives and stationary engines were exhibited, and a special feature was the collection of early efforts by members of the society. The secretary expressed the regret of the members at the unavoidable absence of Brigadier-General Lord Montagu of Beaulieu, who had kindly promised to be present and say a few words respecting locomotives. There was a good attendance.

* * *

Mr. T. C. Pole Winton points out that the engine illustrated on page 374 of the May issue is one of two 0-6-2 tank engines owned by the Brecon & Merthyr Railway, and in use prior to the 0-6-2 class of 1914. He suggests, but is not quite certain, that they were originally numbered 16 and 36.

* * *

WRITING in regard to pre-" Dunalaistair " 4-4-0's on the old Caledonian Railway Mr. Malcolm Niven mentioned that some of the Drummond class work into Ayr on the Edinburgh-Ayr service via Muirkirk and Carstairs, the engines usually concerned being Nos. 1060 (formerly No. 60) and 1083 (formerly No. 83). The latter engine belongs to the class which shared in the race to Aberdeen of 1895. No. 90 worked the West Coast train (80 tons only) from Carlisle to Perth without a stop, the driver being Archibald Crooks. From Perth to Aberdeen the train was worked by Lambie, 4-4-0, No. 17, a slightly larger engine, in charge of John Souter.

* * *

THE following L.M.S. Stations have been renamed :—" Birkenhead Docks," is now known as " Birkenhead North " ; " Rudyard " as " Rudyard Lake " ; and " Rudyard Lake " as " Cliffe Park."

THE Southern Railway Company has removed the restriction against smoking in general waiting rooms, though " the prohibition continues in ladies' rooms."

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A PAPER on " Methods of Working Single Lines of Railway " was read before a meeting of the Metropolitan Graduate and Student Society, Institute of Transport, on April 13, by Mr. W. S. Curtis (graduate).

* * *

A NEW type of ticket-issuing machine is being introduced on the " Underground " which will fully print, number and date the ticket at the time of issue. The tickets, printed on plain cardboard, can be delivered at the rate of five per second. Over 100 million tickets per annum are now issued by automatic machines on the " Underground."

* * *

THE L.M.S.R. have decided to strengthen the coal tips and the approach viaduct thereto at King's Dock, Swansea, with a view to the appliances being brought up to the strength necessary for tipping trucks carrying 20-ton loads.

* * *

ON page 370 of the May issue Southern Railway 4-6-0 locomotive No. 769E was described as " Sir Gareth," instead of " Sir Balan."

* * *

THE Manchester and District Model Railway club arrangements for July include visits on July 3 to Newton Heath Locomotive Sheds ; July 17, Derby Locomotive sheds ; and July 31, to Patricroft Locomotive Sheds. The usual meeting has been arranged for July 13 at the Club headquarters. The June programme has been subject to modification in view of the industrial situation. For particulars apply to Mr. J. A. Dean, Hon. Sec., 29, Gorse Lane, Gorse Hill, Stratford, Manchester.

* * *

WIMBLEDON Model Railway Club arrangements include a debate on " Steam *v.* Electricity," by Messrs. A. W. Lamb and F. L. Gill-Knight, June 7 ; Test Track, June 21 ; and visit to Battersea Loco. Depôt, S.R., June 26. On Monday May 3, Mr. Henry Greenly, A.I.Loco.E., gave a very interesting lecture describing the construction of the Romney, Hythe and Dymchurch Light Railway, dealing with original features in design and construction of locos., rolling stock, general layout and many other points in connection with this unique 15 in gauge line. It is hoped to have a section of the line open for traffic early in July next. The Hon. Sec. of the Club is Mr. J. A. Sheppard, 27, Bernard Gardens, Wimbledon.

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